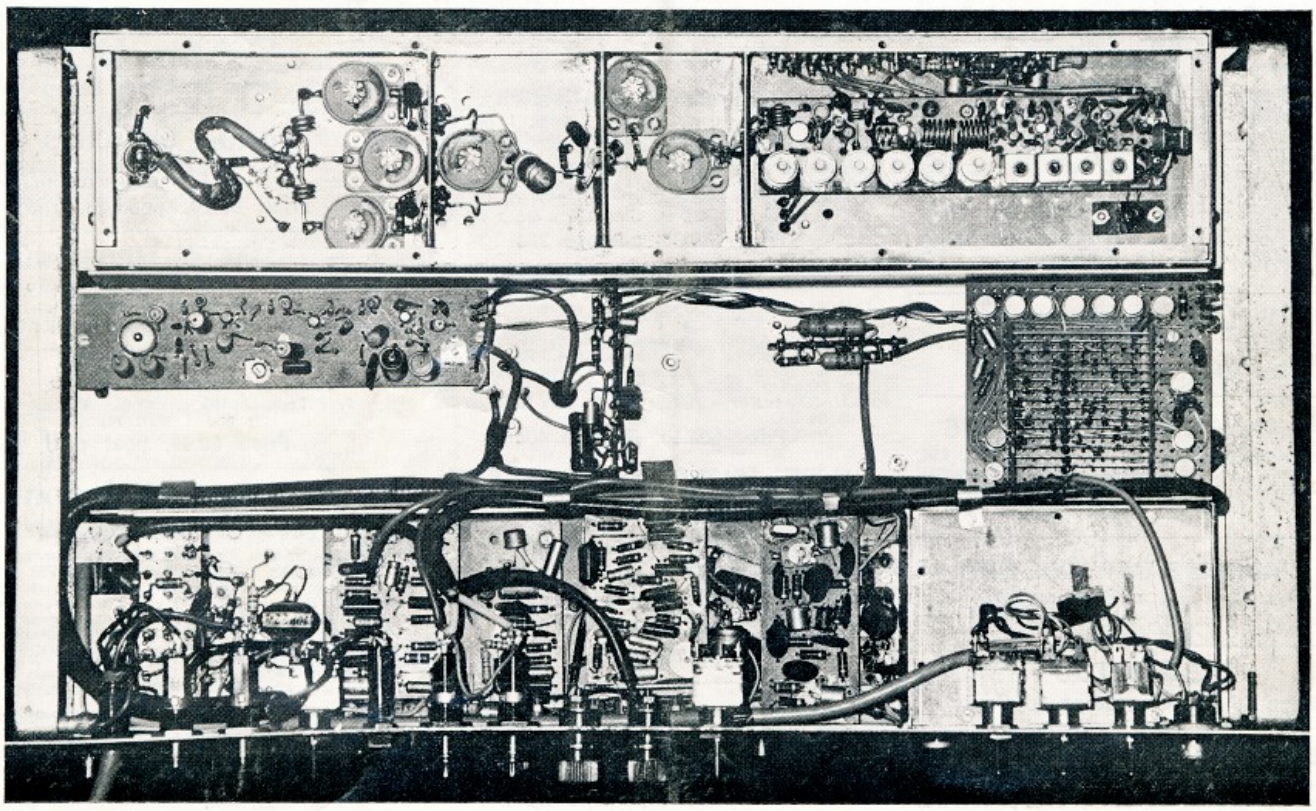
amateur radio

APRIL, 1972



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CONTENTS

COVER STORY

A view underneath the chassis of the VK5 FM Repeater. Top (left to right): SWR protect, final, driver and exciter. Centre: Transmitter audio, 10-minute timer switch, call sign generator. Bottom: Receiver and front panel controls. See page 7 for the first part of this article.

QSP

THE COMPLEAT AMATEUR?

Leonardo da Vinci is a silent key.

And according to the history books he has been for quite some time. Yet one could be led to believe that he is still alive—at least in the minds of some of the delegates to the recent I.T.U. Space Conference — and that Leonardo is a Radio Amateur.

A brief recapitulation — Leonardo da Vinci was the complete genius — a man who lived in the latter part of the fifteenth and the early years of the sixteenth century. He excelled as a painter, sculptor, musician, engineer, architect, natural philosopher (physicist) and mechanician. He crowded into the sixty-seven years of his life a creative output which has so far remained unequalled by any other man. So great was his mastery of all these fields that many scholars concede that he is the only man in recorded history who possessed deep and intimate understanding of all knowledge current in his time and that he probably will remain in this unique position because of the rapid growth of knowledge possessed by mankind. No man today could hope to master all the facets of even one of the branches of science—he would be overwhelmed by sheer volume of detail.

Why then should those engaged in Amateur Radio activities be regarded as exceptional men?

There are numerous areas of particular interest within the Amateur Service—the art of good c.w., propagation studies, radio teletype, mobile operation, equipment construction, conventional black and white or colour t.v., slow scan t.v. (s.s.t.v.), moonbounce propagation, f.m. repeaters, and so on. These interests, whilst not mutually exclusive, are becoming so complex in themselves that, as in the professional fields of communications and electronics, one individual cannot be expected to excell, or even participate deeply in all areas. Probably even the genius himself, da Vinci, if he were alive today, would not excel in all these fields plus painting, music, etc. It should be noted though that these diverse interests have at least one common denominator—self education. The individual participating is learning something perhaps unconsciously so, but, if he enjoys it then no doubt painlessly so.

Experimentation can be involved in all these areas of particular interest so why is the radio Amateur as an experimenter always looked upon as an equipment builder? Historically, of course, it was a question of having to build most pieces of one's station out of sheer necessity—there was no alternative. But even in the history of Amateur Radio one cannot find evidence of many individuals making the more complex components in their home workshops. Such items as meters and valves were usually purchased—certainly they may have been modified by the Amateurs to vary performance. Thus, in days gone by, the term experimenter was synonomous with equipment constructor, but like everything else wireless has become more complex and it is no longer true to say that "Radio Amateur" equates "Constructor" only.

It is suggested that now the emphasis in Amateur Radio is based on a **systems engineering concept**, i.e. the idea of taking a number of standard modules, perhaps modifying some of them and then welding the lot into a functional whole—for moonbounce or s.s.t.v. The person doing this is surely no less an experimenter than the one who builds his own transmitter or receiver—the use of the commercially built transceiver or receiver allows the experimenter to concentrate on his area of particular interest whether it be propagation studies, s.s.t.v. or aerial design.

(Continued on Page 10)

Is this your last issue of "Amateur Radio"? – it could be if you are unfinancial

A Solid State Amateur S.S.B. Receiver

PART FIVE

B. G. CLIFT and A. E. TOBIN

● This article outlines the design concepts, circuit operation and construction of the r.f. amplifier and first mixer, described in previous issues of "Amateur Radio."

Several approaches to the r.f. amplifier design were considered, the main aim being to obtain good signal-to-noise ratio and cross modulation performance. Whilst the cascode approach would fulfil both these requirements, it would, however, complicate switching of the input and output tuned circuits.

In previous articles it had been suggested that the front end circuitry would be built around an old type 12-channel Philips t.v. turret tuner. Whilst this approach is quite sound, ultimately with the final front end circuitry chosen, the use of a turret tuner for coil switching is not really essential. This simplification is made possible by employing a v.h.f. type N-channel junction FET in both r.f. amplifier and first mixer functions. The device used in the prototype is the FT5245, but the metal equivalent 2N4416 may be used if desired.

Reference to the circuit diagram (Fig. 1) shows the relatively simple approach required for band switching. The aerial coil is identical to the r.f. coil with the addition of the aerial coupling link. Although coil data is provided for only the 80 metre coils, approximately the same L/C ratio should be used for the other bands.

Construction of suitable sets of coils as required should present no difficulties with the aid of a g.d.o. The coils should be peaked at the high frequency end of each band with due allowance being made for stray shunt capacitance. Tuning of the aerial/r.f. coils is effected by varicap diodes, those used in the prototype being the AN965 zener diode which provides approximately 30 pF. capacitance range. If a smaller range is considered desirable on the high frequency bands, this may be achieved by switching appropriate values of resistors in series with the 4.7K pot to limit the voltage range applied to the varicap diodes.

A.g.c. control is applied to the r.f. amplifier by using an 2N4248 transistor to reduce the drain current of the r.f. amplifier. The AN753 zener diode connected in the a.g.c. line provides the appropriate a.g.c. delay. The delay is selected to enable the r.f. amplifier to operate at maximum gain provided the i.f. amplifier is still operating within its a.g.c. range.

CONSTRUCTION

The 80 metre coils are constructed on 5/16" diameter polystyrene formers fitted with suitable tuning slugs. The finished coils are then fixed to tuner biscuits using "Araldite" epoxy resin. The value of inductance is approximately 18 μH., which then requires 100 pF. to resonate at 3.7 MHz. Using 26 B. & S. enamelled wire, about 65 turns with a 7-turn link spaced 1/16" from the cold end of the main coil should be satisfactory. The 100 pF. ceramic capacitor is also mounted on the biscuit.

Care should be taken to ensure that coupling between input and output circuits of the r.f. amplifier is minimised otherwise instability will result. It is good practice to incorporate a small grounded shield between the FET leads to prevent stray coupling.

The 9 MHz. drain coil for the mixer is wound on a Neosid former mounted in a standard can but no cup or ring is used. Primary consists of 30 turns, 30 B. & S. enamelled wire with a 3-turn secondary wound over the cold end.

A circuit for the crystal calibrator is shown in Fig. 2. A 3.5 MHz. or 1 MHz. crystal may be used as required.

CONCLUSION

Whilst in this and previous articles a considerable amount of construction detail has been provided, this information has been included for the purpose of indicating some of the practical techniques which were used in construction of the prototype.

The prime purpose of the series of articles has been to provide a source of ideas to assist those desirous of engaging in such a project. The approach is by no means the only one likely to be successful; and the Amateur with experience in this area is to be encouraged to expand his own ideas. Consequently no provision has been made to have kits of parts including printed circuit boards made available. With the vast array of transistor types currently available today it is perhaps difficult to make a suitable selection. If the foregoing articles help to sort out this problem to the satisfaction of the Amateur, then they may be considered to have achieved their basic purpose.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the help provided by the management of Fairchild Australia Pty. Ltd., in making equipment and material available to complete this project. Special thanks go to Messrs. B. T. O'Shannassy and R. Chapman for their many helpful suggestions and criticisms, and to "Amateur Radio" for reproducing the articles. Complete set of the articles can be obtained by writing to A. E. Tobin, C/o. Fairchild Australia Pty. Ltd., P.O. Box 151, Croydon, Vic., 3136.

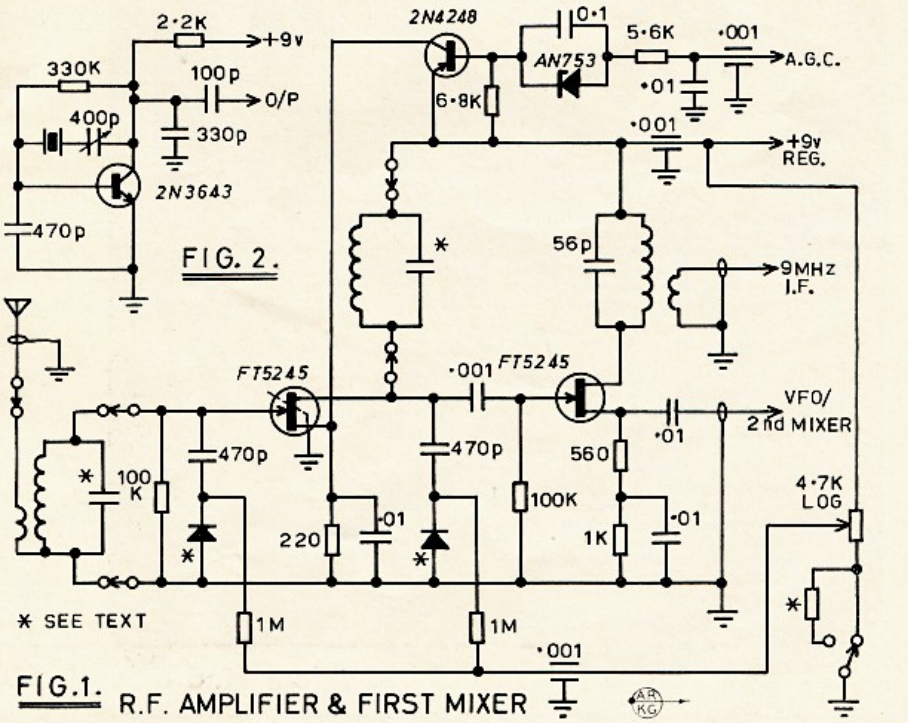


FIG. 2.

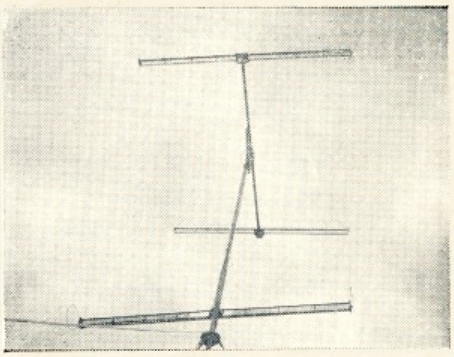
FIG.1. R.F. AMPLIFIER & FIRST MIXER

"THE RAKE" ANTENNA

A Rotatable Dipole for 40 Metres and a Mini-Mini Beam for 20 Metres

L. T. E. SCOWN, VK5YS*

Like to try something different and smaller for DX on 20 and 40 metres? Here is something for the small garden and not difficult to construct.



A worm's eye view of both antennas. The 40 mx Single Rake is below the 20 mx Double Rake. Note the angles the hats are bent.

The antennas to be described are a rotatable dipole for 40 metres and a 2 element driven array for 20 metres. Each element in each antenna consists of two helicals wound over a triangular cross-sectional former 6 feet long.

The end triangular spacers are made from $\frac{3}{8}$" thick insulating material (perspex was used), whilst the other spacers are $\frac{1}{8}$" thick (see Fig. 1).

The coils are commenced from the element ends (capacitive hat end) and wound towards the feed point. More turns were wound on than necessary (each length of wire used was approximately five-eighths wavelength long) for each coil initially and then tapped out from the feed point to resonate each element.

Capacitive hats of various diameters were tried, using the spoke wheel variety, but the method shown in Fig. 2 was finally adopted as being the easiest to adjust to bring the s.w.r. to a satisfactory minimum.

The first investigations were carried out with the 40 metre single "Rake". The element former is of the same construction as the double "Rakes" for 20 metres. The former consists of three six-ft. lengths of wooden dowelling coated with "Estapol" for weather proofing. The length of six feet was chosen simply because dowelling is readily available in that size. The end triangular spacers were then fitted on to the ends of the three dowel rods. The other spacers were clipped into place and then all spacers were "Araldited" to the dowels. A piece of insulating board was fitted to the centre of each element to facilitate installation. Four holes were then bored, one in the centre of each end spacer and two spaced 2" apart in the centre board. In each hole was fitted a $\frac{3}{4}$" x 2 BA bolt and one nut.

The coils were wound in the normal manner by tying one end of a length of 14/.007 p.v.c. covered wire to the back fence and fitting the other end to the 2 BA bolt on one of the end spacers. The wire was kept taut as it was wound whilst walking towards the back fence. Before winding commenced, marks were placed one inch apart on one of the wooden dowels to assist in keeping the correct spacing during the winding procedure (see Figs. 3 and 4 for the coil data).

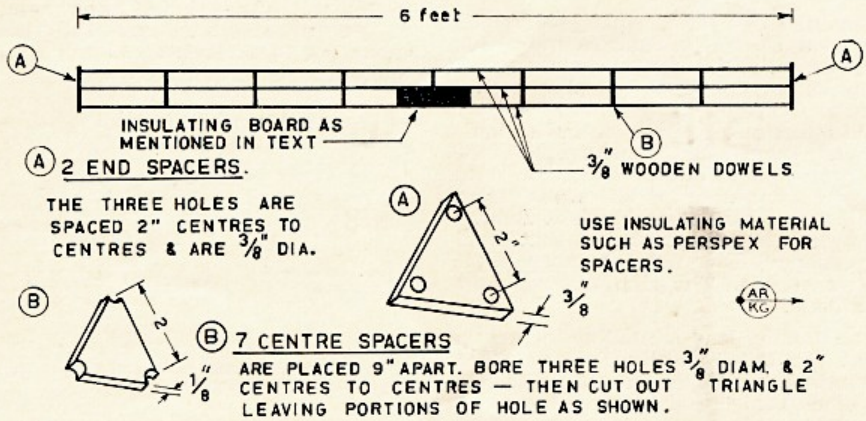


FIG. 1 CONSTRUCTION OF ELEMENT FORMERS

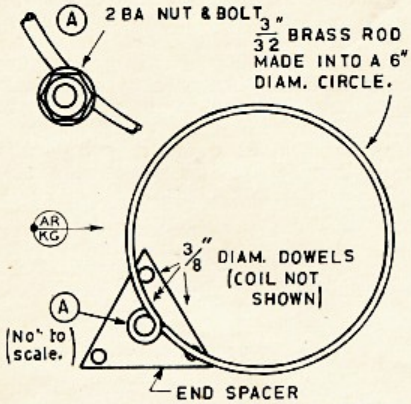


FIG. 2 FITTING OF CAPACITIVE HAT TO END SPACER

* 59 Oxford Street, Brahma Lodge, S.A., 5109.

Note.—The two coils on each element are wound in the same direction.

40 METRE SINGLE RAKE

Tuning up of the 40 metre single rake was relatively simple. The hats are bent until the best s.w.r. is obtained. At a height of 6 feet, the angle of bend was approximately 70° and the s.w.r. 1.4:1. At 10 feet, the angle was 80° for minimum s.w.r. and 90° for 20 feet above ground. It was left at this height for a fortnight for comparisons against an "inverted vee" dipole which is 38 feet high. The results were comparable on transmitting, but the real advantage was noticeable on receiving. During night time operation the QRM

(continued next page)

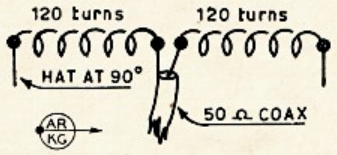


FIG. 3 40 METRE SINGLE RAKE

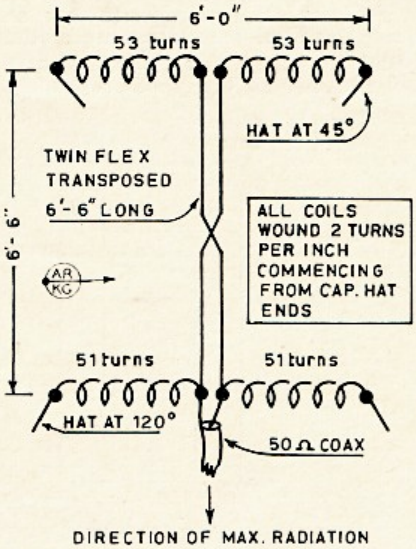
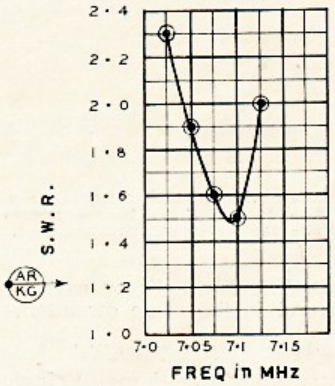


FIG. 4 20 METRE DOUBLE RAKE

from the north could be almost eliminated by pointing the ends north. 50 ohm co-ax. was used, and the s.w.r. obtained was as Fig. 5, but no doubt the s.w.r. could be improved by using 70 ohm co-ax.

FIG.5



40 METRE SINGLE RAKE ANTENNA

THE 20 METRE DOUBLE RAKE

This antenna comprises two "Rakes" spaced 6 ft. 6 in. apart on a 2" x 1" wooden boom and fed out of phase with ordinary twin flex light wire.

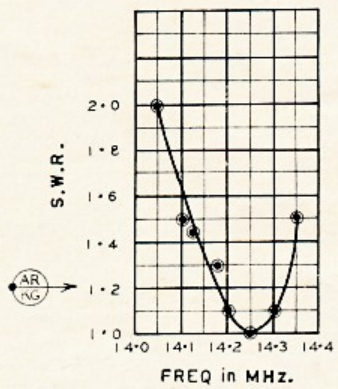
Whilst one "rake" was being tuned, the other was removed. Tuning procedure was the same as for 40 with all hats finally bent at 90°. The antenna was then assembled, and the phasing line connected. The complete unit was set about 8 ft. above ground, and tuning was commenced for best s.w.r. One pair of hats was bent until the s.w.r. was at a minimum, then the other pair was attended to so as to bring the s.w.r. further down. Then back to the first pair and the process continued until the s.w.r. was approximately 1.2:1. This figure was achieved when the bending angles of the hats were as shown. See Fig. 6 for s.w.r. figures.

The 20 metre double "Rake" appears to have a back-to-front ratio of the order of 11 dB. This figure was obtained by averaging out prolonged tests on receive. On transmit, it was confirmed by local and Interstate stations.

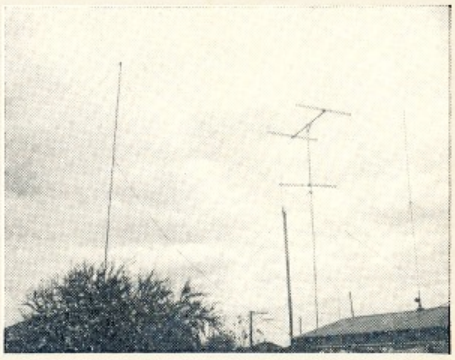
Both the antennas are installed at the present time as the photographs show and they have given very good results, an 80 metre one will shortly be installed. They should adapt quite readily to caravans when a rotatable is desired and space is limited. Mine was found to be very robust and providing the finished product is well coated with "Estapol" or the like, they could remain aloft indefinitely.

They are extremely cheap to build and they give surprisingly good results. One last remark, the reader may be wondering why I have referred to the antennas as "Rakes". If you build the 40 metre one and erect it in your yard, I am sure the reason will become obvious, especially if the reader has a yen for gardening.

FIG. 6



20 METRE DOUBLE RAKE ANTENNA



A general view of the Rake Antennas among others of the standard variety.

THE VANILLA WATTMETER

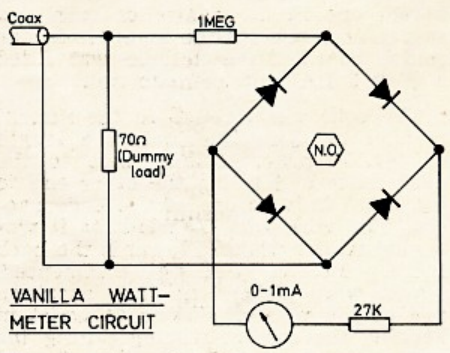
A Dummy Load incorporating a Direct Reading Power Meter

BRIAN J. WARMAN, VK5BI*

It is very convenient, especially when operating s.s.b. equipment, to be able to measure the output power. As it seems that the supply of cheap r.f. ammeters has dried up, the only way out these days is to make or buy. The writer preferred to make one.

The licence states that 400 watts p.e.p. **output** can be run. In the above sentence **output** is the operative word. Many of our appliance operators would turn to Oragami crane making if they could measure the power output of their 400 watt **input**-rated transceivers. Since 400 watts p.e.p. output corresponds to a mean r.f. output of 200 watts when using a two-tone test signal, it follows a power meter indicating at that level or perhaps just a fraction more is all that is needed. The circuit shows how it is done.

The dummy load is used as the actual shunt for the indicating circuit. The 1 megohm resistance serves to isolate the diode bridge and improve the s.w.r. (there is ample sensitivity). The diodes are normal germanium small-signal types in a full wave configuration; this was found the best arrangement for continued accuracy, probably because of low impedance. The 27K resistor serves to calibrate the meter. It could be replaced with a variable element.

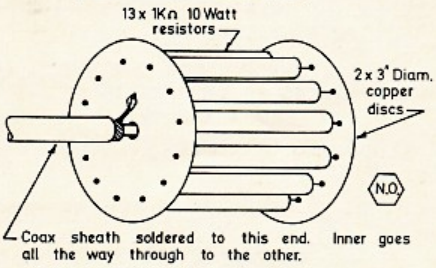


VANILLA WATT-METER CIRCUIT

* Cowell, S.A., 5602.

The load consists of 13 carbon resistors. This gave 70 ohms to suit the author's set-up. The resistors came from a disposal source. They would be approx. ½" diameter and probably rated about 10 watts. They are more than adequate for 400 watts s.s.b. and 150 watts a.m. The sketch shows an arrangement suggested by VK5VB for mounting these resistances and the one subsequently employed.

DUMMY LOAD DETAIL



The device was calibrated with the aid of an electronic voltmeter using the $P = E^2 \div R$ formula. If you cannot get access to such an instrument you could use an r.f. ammeter provided the calibration is reliable, or even a calibrated oscilloscope again using the above formula. An idea in a magazine years ago employing a photographic light meter and a series of lamps of differing wattages as a comparative measuring set-up has even been seen, but this does not appeal.

Using a 0-1 mA. meter in the wattmeter it was found:—

200 watts	reads	0.8
100 watts	„	0.64
50 watts	„	0.5
and 25 watts	„	0.4.

Why the title? The author lives in the bush and likes to improvise. The dummy load/wattmeter was mounted in a metal ½-gallon ice cream can of about 5½ cubic inches.

AN F.M. REPEATER

PART ONE

IAN CHAMPION, VK5ZIP*

Many operators tend to take for granted the enormous amount of work which goes into the provision of a repeater. Here is a glance at the experiences of one group in establishing an operation repeater which, of course, services the needs of many operators.

By now, many thousands of words have been written about repeaters, how to build them, how to use them, and what features can be fitted to them. All the well documented articles seen are of American origin and although embracing good ideas, comply with different rules to those we experience here in VK-land. The P.M.G. Department in Australia has laid down certain requirements for the operation of Amateur repeaters in this country. Here in Adelaide, a small group has built a unit that complies with P.M.G. requirements and has provided a reliable service since January 1971.

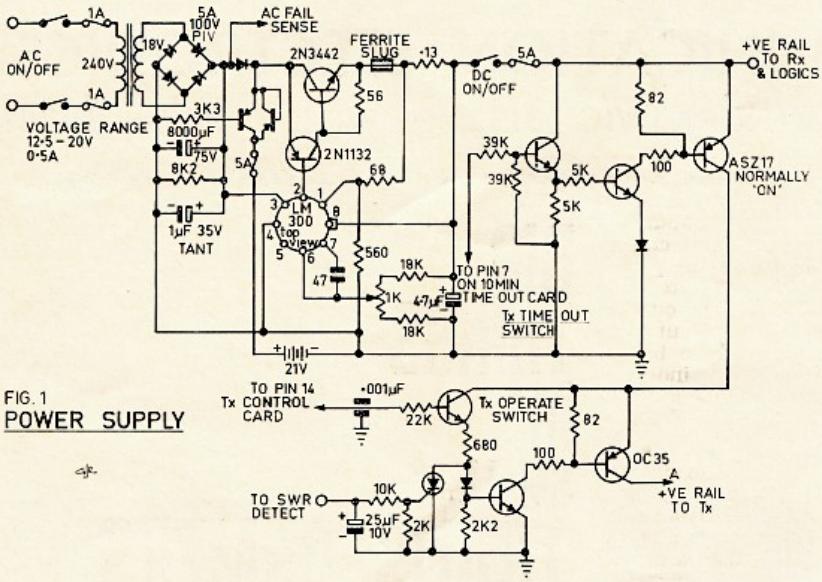


FIG. 1
POWER SUPPLY

To start the ball rolling in an information exchange that may assist other groups interested in establishing a repeater, details of efforts and experiences are submitted.

In early 1970 six interested Amateurs formed a group to discuss getting the project under way. It was resolved that the device was to be fully solid state and as much "state of the art" as our limited resources would allow. At this point Brian VK5ZNK stepped forward and donated a T.C.A. 1675 base station receiver. We baulked at the idea of our first step being to commercial equipment, then realised that nobody could produce anything better for the price, so this became our basic building block.

Further discussion resolved that the transmitter would be power compatible with current mobile equipment and would initially run 10-20 watts r.f. output. Garry VK5ZK was nominated to head the group and he immediately began farming out projects. Bart VK5GZ was to build the power supply, Frank VK5ZHF the transmitter, Rick VK5ZFQ went off to play aerials, whilst Garry and Ian VK5ZIP retired to plan the merging of all the bits.

It is not intended to go into detail regarding the transmitter and receiver construction as they are basic to any repeater and need not necessarily follow the configuration we employed. Briefly, however, for those familiar with the 1675, the front end was converted from bipolar transistors to FETs and a FET pre-amplifier added. A two-stage d.c. amplifier was added to the mute circuit to interface into the control circuitry and the whole receiver re-wired for negative earth operation.

The transmitter was built into an identical chassis to the receiver except that it was completely sealed, with d.c. and metering being fed via feed-through capacitors at one end and an aerial socket at the other. The output transistors are a pair of 40282 and although capable of higher output, are only driven to 15 watts at this stage. Although the transmitter is home-brew, it finally finished up with a T.C.A. 1680 audio and exciter card due to time-consuming problems with temperature stability in the original oscillator.

The power supply built on a third identical chassis, employs an electric blanket transformer and an IC to supply and control a 5 amp. current-limited +14v. rail. As this supply could be of general interest, a circuit is included in Fig. 1.

CONTROL CIRCUIT OBJECTIVES

It took many months before transmitter, receiver and power supply were mated together in a small box; in that time Garry and Ian came to grips with the problems of the control circuitry. Rather than technical, the problem was to provide an aesthetically pleasing "modus operandi" that still complied with Departmental requirements. To satisfy the transmission time limit requirement we decided two solid state switches were to be fitted in series in the positive rail to the transmitter and coupled to two uni-junction transistor (UJT) timer circuits. The first switch would be normally "on" and coupled to a 10-minute timer. The second, effectively the transmitter "on-off" switch, would be normally "off" and coupled to a 5-minute timer. With an incoming signal the second switch was to be turned "on" and operate the transmitter, at the same time both timers would begin counting.

If the incoming signal (or noise say in the case of a mute failure) continued for five minutes, the 5-minute timer would turn off the second switch and cut the transmission. Once the incoming signal ceased, this circuit would automatically reset and allow normal operation again. During normal operation both timers would be reset at the end of each over.

In the event of a failure in the 5-minute timer the transmission could continue as long as 10 minutes then the 10-minute timer would turn off the normally "on" switch and isolate the positive rail. This circuit would have a manual reset only and would require somebody to attend the site.

It was also considered essential that the transmitter remain on during weak signal flutter to eliminate excessive chopping of the re-transmitted signal. Rather than delay the mute recovery time and transmit noise, a third timer would be used—operate time one second—to delay the switch off of the transmitter after the incoming signal disappeared. This would result in one second of blank carrier at the end of each over.

After considerable thought it was decided that the transmitter would be controlled by the receiver mute. The other possibility was to sense receiver limiter current, but false triggering of the transmitter due to changes in noise level ruled this system unsatisfactory.

* 16 Tarranna Avenue, Parkholme, S.A., 5043.

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LM41

On the matter of identification, m.c.w. seemed the obvious answer, but how and when? How was solved by the guideline "all solid state"—so, a handful of ICs and lo presto, call signs at the speed of light—but we settled for 25 w.p.m. When was guided largely by P.M.G. requirements, exactly when involved quite considerable discussion. The approaches to this are many and varied, each has its own advantages and drawbacks. Our reasoning ran something along these lines:

An ident each and every five minutes, 24 hours a day, a good beacon sure, but this State has had a two metre beacon for years. A call sign every five minutes of 'on air' time? This means that Joe Bloggs can come up and say to Bill Smith: "See you in the local in two minutes." No ident! A call sign at the start of each over? VK5ZdiddelyK diddely VK5diddelyZIP diddely diddely calling . . . yuk! How about at the **end** of each over? Okay, but still too many call signs, the average mobile 'over' on a busy net is 1-2 minutes and many of only a few seconds. How about a call sign at the end of the first over, inhibit call signs for the next few overs then towards the end of the five-minute period, enable the call sign to tack onto the end of the over in progress. Great, but I like that beacon idea, good for the DX station!

Right, let us say a call sign at the end of the first over, then inhibit call sign but if after say seven seconds there is no reply, cancel call sign inhibit and the next transmission has a call sign on the end, i.e. any seven-second break in the incoming signal allows the call sign to be generated when the next incoming signal ceases. As the call sign takes 3-4 seconds, it only requires a three-second wait after a call sign to be able to initiate another one. This feature allows a station to optimise his receiving equipment or check out dead spots when there is no one else around. Immediately a QSO commences the call sign is cancelled for a period of four minutes. Theoretically it is possible for no ident to occur for nearly seven minutes, but experience has shown that a call sign is initiated approximately every 4-5 minutes during long QSOs.

Having convinced ourselves of our objectives we set about lashing up some working circuits. These grew three dimensionally . . . as did the pile of dead marines around the shack. The first tests with these circuits proved quite amusing—they worked fine individually, but hooked to the repeater, back circuits and transients played havoc, circuits refused to obey instructions from the test facilities on the front panel, and the whole device just sat there and talked to itself.

One by one, the many problems were overcome and the umpteenth copy of the circuit diagram became the real thing. The problem of mounting the circuitry was solved by using reject computer cards. After a lot of tedious work we succeeded in mounting 80% of the circuitry using the existing printed tracking. This resulted in a neat card with very little jumpering on the back. All the circuitry fitted comfortably on three cards which plugged into sockets mounted on the power supply chassis. The first card contains the transmitter control circuitry, the second the ten-minute timer, and the third the ident control circuitry.

CONTROL CIRCUIT OPERATION

Fig. 2 shows details of the transmitter control circuit which operates in the following manner. A two-stage d.c. amplifier fitted to the receiver mute transistor causes +11.45v. to appear at pin 13 when the mute is open and 0v. when closed. When a signal is received the mute opens and Tr1 turns on a lamp on the front panel. The + level is also fed via a 10K pot and 2 µF. by-pass to Tr2/Tr3 which are wired as a Schmitt trigger. The 2 µF. and 10K pot smooth out weak signal "picket fence" type flutter and afford some control on the switch sensitivity.

Tr2 turns on and Tr3 snaps off, generating a sharp pulse which is a.c. coupled to Tr4/Tr5 which are wired as a bistable pair. (The Schmitt trigger is employed to guarantee a sharp pulse of the correct level each time the mute opens.) Tr4 turns on and Tr5 turns off. The + level on the collector of Tr5 is used to turn the transmitter on by operating the transmitter on-off transistor. (See power supply circuit diagram.) Tr6 also turns off and the + level at its collector allows the five-minute timer to commence working. Tr7 turns on and lights a front panel lamp.

When the incoming signal ceases and the mute closes, Tr1 turns off, extinguishing a front panel lamp and Tr2/Tr3 flip back to their former state. The + level now on collector Tr2 allows the one-second timer to operate and fire a shot into the base of Tr5 flipping the bistable pair and turning the transmitter off. Tr6 turns on and resets the five-minute timer. Tr7 turns off and extinguishes the front panel transmitter lamp. In the event of the mute being open for more than five minutes continuously, the five-minute timer fires a shot into the base of Tr5

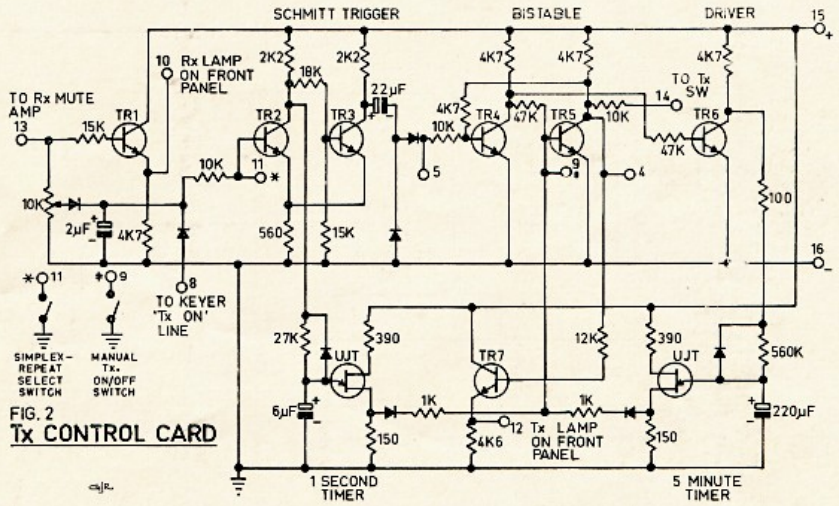
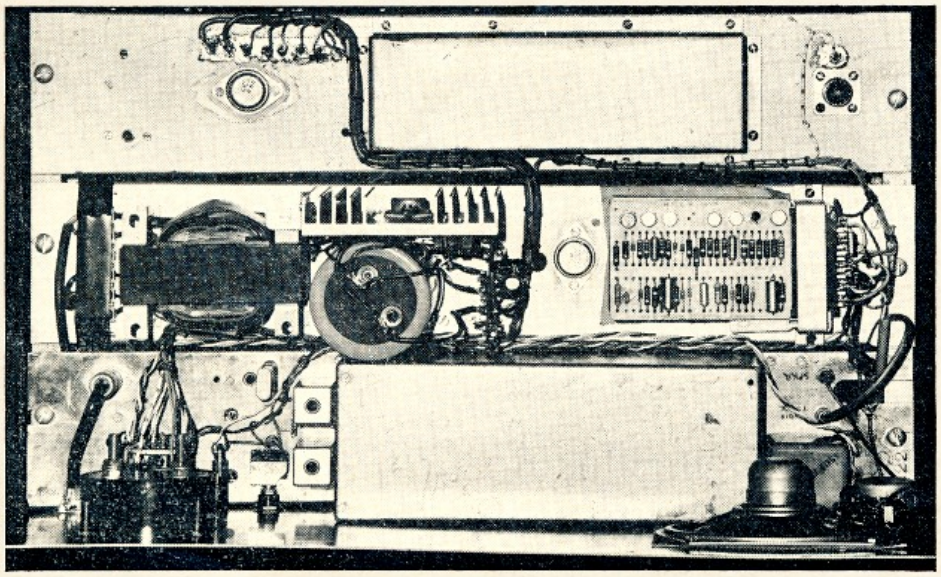


FIG. 2
Tx CONTROL CARD



Top view of repeater. Top: Transmitter. Centre: Power supply—with plug-in control cards at right. Bottom: Receiver—with metering on the left and monitor loudspeaker at right.

and turns the transmitter off. As the Schmitt trigger is a.c. coupled to the bistable, to bring the transmitter on again requires the mute to close at least momentarily to allow the Schmitt trigger to reset so that Tr3 can pulse Tr4 when the mute opens again.

The 10-minute timer employs a single unijunction transistor and identical circuitry to the one-second and four-second timers save for the R/C values. The shunt diode provides the capacitor discharge path when the timers are reset.

Tantalum capacitors are used in all the timers, the 10-minute timer using 100 μF. and 3 megohms. The 10-minute accuracy is ±15% over a temperature range of 50-100°F. The circuit could obviously be made more accurate, but this was considered unnecessary in this application. (The five-minute timer is always within a second or two.)

The 10-minute timer operates into one side of a bistable pair which controls the normally "on" series switch to the transmitter. Once this bistable has been flipped, the positive rail to the transmitter is broken and can only be restored by resetting the bistable by

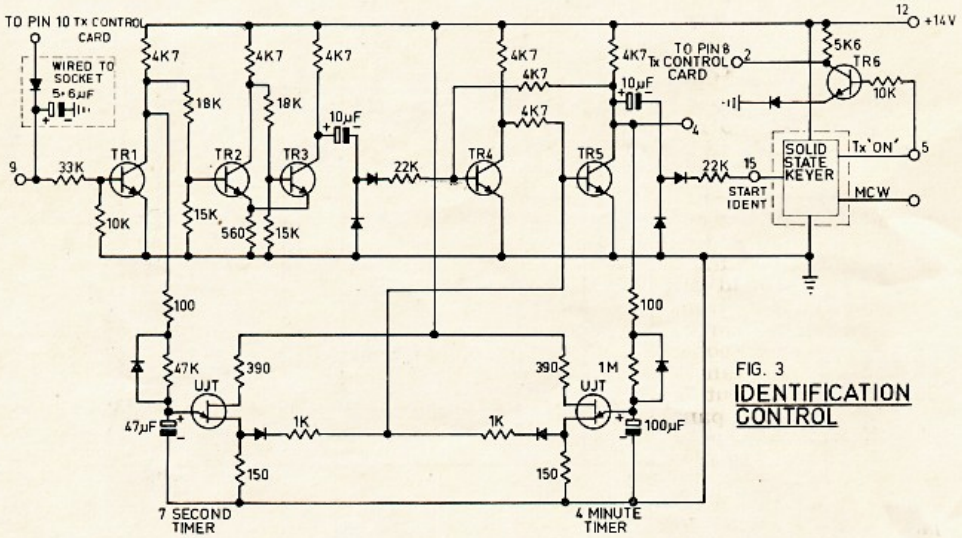


FIG. 3
IDENTIFICATION CONTROL

means of a press button on the front panel. A switch on the front panel shunts the 3M charge resistor with approximately 120K to allow the timer to run at 30 seconds for test purposes.

The ident control circuit (Fig. 3) is very similar to the transmitter control card in that it employs two timers and a Schmitt trigger to drive a bistable pair. When the mute opens + level from card 1 turns Tr1 on, Tr2 turns off and Tr3 on—this has no effect on the bistable pair Tr4/Tr5. When the mute closes, the + level from card 1 disappears, but Tr1 remains held on for 100 ms. or so because of the charge in the 5.6 μF. capacitor. Tr1 then turns off, Tr2/Tr3 flip over and the resultant shot from the collector of Tr3 flips the bistable pair Tr4/Tr5. The + level now on the collector of Tr5 is used to initiate a call sign cycle in the solid state keyer. (The 100 ms. delay allows the receiver and mute circuits of the calling station to recover and not clip the first character of the call sign.)

A zero level within the keyer during the cycle time of the keyer is used to turn Tr6 off. The + level on the collector of Tr6 is fed to pin 8 of the transmitter control card and holds the transmitter on during the call sign cycle. At the end of the call sign cycle Tr6 turns on and one second later the transmitter turns off. With the next received signal Tr1 turns on, Tr2 off and Tr3 on. When the signal ceases, Tr3 turns off and pulses the base of Tr4. This pulse has no effect however, because Tr4 is already on, so no call sign is generated.

This situation continues for four minutes then the four-minute timer—which commenced operating when the call sign was initiated—pulses the base of Tr5 and resets the bistable pair. The end of the transmission in progress at that moment (or the next time the mute closes) will then initiate a call sign.

In practice it was found convenient to set this timer a few seconds shorter in duration than the five-minute timer in the transmitter control circuit as this allows the call sign to be enabled prior to any station being "timed out". The effect of this is apparent when a station over-runs the five-minute limit and locks the repeater off. When his transmission finally ceases the receiver mute closes, an ident will automatically announce the channel is clear.

The second timer in the ident control circuit allows a beacon effect to be achieved without having to wait five minutes for the ident. During the period when no signal is received and the mute is closed, the + level on the collector of Tr1 allows the seven-second timer to operate. If the mute remains closed for seven seconds, the timer pulses the base of Tr5 and resets the bistable pair, resulting in an ident at the end of the next incoming signal.

This configuration has proved quite effective although no claims are made that this arrangement would suit all environments. The golden rule for this system—or for any net—is to allow the incoming signal to your receiver to cease before you transmit. This allows the timers to reset before each over. The rule also applies during an ident, for although it is possible to talk over the ident, failure to allow the timers to reset means that the next transmission will be repeated **only** for the remaining portion of the five-minute period allowed for each over. For the long-winded types, a one-second break in transmission will allocate a further five-minute period.

(to be continued)

☆

QSP

(Continued from Page 2)

Certainly, it must be admitted that there are **some** people in the Amateur ranks today who **only** buy commercial equipment, plug it in and operate. But who can really say that it ends there—even the most obvious "appliance operator" is educating himself. He must learn to tune, adjust and operate his equipment, albeit badly initially, but he will learn by his mistakes and such knowledge could be invaluable to the community in times of need. Unwittingly, too, he may provide, for example, the signal that helps in the solution to the "Long Delay Echo" problem.

Consequently, the fact that members of the fraternity buy commercial equipment and even have it serviced commercially, may not make them any less an Amateur Experimenter than the "equipment constructors" of bygone days. But other concepts must be injected into the minds of the right people — those that attend Geneva Conferences—and so the Amateur Service has a P.R. problem—to educate such people that there is more to Amateur Radio than just building transmitters and receivers, but also that today the "Compleat Amateur" is a mythical beast as is the "Compleat Painter" or the "Compleat Philosopher".

Leonardo da Vinci **is** a silent key.

—D. H. RANKIN, VK3QV,
Federal Vice-President.

PIRATES: 2 METRES AND 11 METRES

At Lilydale (Victoria) Court of Petty Sessions on 25th February a case involving illegal transmissions in the 2 metre band was heard by the S.M. and proven. Defendant was ordered to enter into a good behaviour bond of $200 for three years and a surety of $200 plus $30 costs, to appear for sentence when required (within the period) and all the equipment involved was forfeited. Details of other cases (11 metre band offences) are not yet to hand. (de VK3ZDK)

SUBSCRIPTIONS

A last reminder concerning W.I.A. subscriptions. If you have not paid yours, please do so as soon as possible. If your name is removed from the mailing list it will take several months to re-instate it. Meanwhile any "A.Rs." which you will miss may not be replaceable because only a limited quantity of "overs" is printed each month.

INDONESIA

To hand are several issues of the new Indonesian bulletin "Zero" published monthly by O.R.A.R.I. Region 0, Djakarta, by R. A. J. Lumenta, YB0BY, and his XYL. Although these are in Indonesian it is obvious that concentration is on basic principles with circuits exclusively on valve gear and some local news. Splendid material resulting from immense effort.

OSCAR EXPERIMENTAL REPEATER

A licence has been granted for the operation of an experimental translator, VK3WIA/R5, on Mt. Martha to familiarise users with Oscar

(Continued on Page 12)

TACKLING T.V.I.*

● No apology is required for re-printing this TVI article from "Radio Communication" (R.S.G.B. journal of October 1971). Readers should note that there are differences, but the principles are the same.

There is a wealth of information available to anyone wishing to study the literature and work on the problem which is, of course, a two-part one as there are two sets of equipment involved.

THE TELEVISION RECEIVER

Unlike the Amateur signal, which is one modulated carrier not more than 8 kHz. wide, the television signal contains two carriers, sound and vision. The sound signal is about 50 kHz. wide, and the vision signal is some 3½ MHz. wide on 405 lines and about 5½ MHz. wide on 625 lines. To receive all this the t.v. set must be a broadband receiver, which makes it rather susceptible to any strong signal. Its r.f. stage may be overloaded by the Amateur signal and generate many spurious signals which break through in the form of sound bars, cross hatching and/or audio interference.

The fact that the interference affects all channels will suggest that the fault lies with the t.v. set, which needs assistance to sort out the signals it should be receiving from those it ought to reject. This can be given by adding a rejection filter as near to the first stage as possible.

If the Amateur owns his t.v. set the filter can be put inside the back of the cabinet, but it is more usual to fit it on the outside of the cabinet on the end of the aerial feeder. A high-pass filter will attenuate all signals below its cut-off frequency but will have a frequency of maximum attenuation. In commercial filters this is usually about the i.f. of the t.v. set (35 MHz.). Ideally the maximum attenuation should occur at the frequency giving trouble, so an Amateur who works 14 and 21 MHz. only, for instance, could make himself a more effective filter by following an Amateur design or by designing his own from the details in the "Radio Communication Handbook".[1]

With a v.h.f. transmitter the situation is more complicated because the t.v. set may need to receive signals above and below the Amateur signal, say at u.h.f. Channel 9 (190-195 MHz.), Channel 2 (48-53 MHz.), when the transmitter is at 145 MHz. In this case a notch filter for 145 MHz., as supplied by some t.v. firms, or a co-axial stub is the obvious answer. When the t.v. receiver is u.h.f. only a high-pass filter is adequate, and this can take the form of a v.h.f./u.h.f. diplexer with the v.h.f. output terminated in 75 ohms.

Some Amateurs have found that a high-pass filter does not solve all their troubles at the t.v. set, as the Amateur signal sometimes enters by the mains or on the outer braid of the co-axial lead. The former can be inhibited by a mains filter[1] at the t.v. set, and the latter by a braid filter or a quarter-wavelength stub and/or by earthing the braid.[2] The braid filter will either make a break in the aerial feeder or add impedance by coiling co-axial cable around ferrite toroids. A quarter-wavelength of insulated wire connected to the outer braid at the set end will sometimes be effective against a particular frequency. Earthing the braid without breaking it, and so providing the interfering signal with an alternative route, is another answer. The solution to any particular problem is very much a matter for experiment.

THE AMATEUR TRANSMITTER

Particular attention has to be paid to the spurious outputs generated by the transmitter which fall in the t.v. channel.[3] The basic rule here is not to generate them, but if this cannot be avoided they should be kept at home. Many Amateurs now buy commercial transmitters and so have little say in what frequencies are used, though this is something to be considered when buying a new rig. Try to find out what frequencies are produced and work out which ones might cause trouble.[4] One thing is certain—the transmitter will have harmonics, so as a matter of course a low-pass filter to reduce the level of any which fall in the local t.v. channels will be needed.

The amount of attenuation required depends on the strength of the harmonics in relation to the t.v. station's field strength at the receiver. In an area of weak field strength, radiation from the Amateur transmitter will need to be housed in an r.f.-tight box.[5] In this respect some commercial transmitters are better than others, and when buying one look out for large holes in the front or back panel and badly fitting inspection doors which may cause trouble. All the leads into and out of the box should be by-passed and all connections between boxes in the transmitting system, i.e. low-pass filter, Z match, etc., should be of co-axial cable with proper connectors at both ends of each length, however short.[6] It is not safe to assume that a commercial rig is adequately screened and filtered, almost certainly it is not. In some cases a great deal of work is required to make it harmonic proof.

In many cases though, all these precautions are not necessary and simply installing a low-pass filter will effect a cure. A low-pass filter is needed to ensure that only lower frequency signals can get out to the aerial and any accidental frequency above the cut-off frequency of the filter is attenuated. In a Channel 1 area it is obviously important to have a low-pass filter with a cut-off below 41 MHz. A v.h.f. transmitter may also have sub-harmonics when a band-pass filter is more suitable.[7]

An Amateur transmitter is also capable of producing any number of odd spurious frequencies, most of which will be at such a low level as to be completely unnoticeable, but there could be one or two odd mixer products which would be sufficiently strong to cause trouble, or even a parasitic oscillation. Again, these will be substantially attenuated by a filter, but if the specific frequency can be tracked it is better to attack it at the source.

The only way to be sure that the transmitting system is clear of t.v.i. is to test it.[8] A simple and useful gadget for detecting r.f. leakage is a search coil. Make a small coil, say a couple of turns about 1" diameter in 16 s.w.g. and solder one end to the inner and the other to the outer of a length of co-axial cable. Fix an appropriate co-axial connector on the end. Make a T junction box with a tobacco tin and three co-axial connectors, one on each end and one somewhere in the middle, inners connected inside the box. Then connect the search coil to the t.v. set and t.v. aerial lead by means of the junction box. If the t.v. picture is much weakened, prune the line to the search coil a little. After installing the transmitter and television receiver in the same room the loop can be used to search over the transmitter cabinet while it is working into the dummy load and any hot spots where r.f. is leaking out of the cabinet will be revealed on the t.v. screen. Test the leads, knobs, meter holes, filter boxes, etc., and make a note of any places that need attention.

Next test the transmitter on open aerial with transmitter and t.v. receiver in their usual places. If they are in different rooms it will be most helpful to have a fellow Amateur to assist with the observation. Repeat the tests at both ends and in the middle of each Amateur band for each channel on the t.v. set and make a note of the results. If this can be done when trade transmissions are being made, so much the better.

Sometimes at this stage the Amateur finds his transmitter is clean on, say, every band except the h.f. end of 21 MHz. on every channel except Channel 5. That is an easy one, $21 \times 3 = 63$. So it is the third harmonic of 21, and either a low-pass filter that has maximum attenuation covering the third harmonic of the 21 MHz. band, or a tighter box, or more lead filtering, or a combination of these is needed. But whatever the results, look for a pattern. See if a harmonic relationship between some frequency in the transmitter and the frequency in trouble can be traced. Oscillator and mixer frequencies are usually given in equipment manuals, so if in doubt read the book. Work on the rig as seems appropriate and then re-test. Do not be downhearted if it is not clear on a second test, there is always something else that can be done. Interference is curable, even if it takes a lot of work to do it.[5]

T.v.i. can be caused or made worse by over-driving the final amplifier, by over-modulating,[9] and by key clicks, and it may be possible to clear it simply by taking it a bit easier, by using a speech clipper or a click filter. It has also been cured by using less power, but the same effect could often be achieved by turning the microphone gain knob back slightly.

(Continued on Page 12)

* Reprinted from "Radio Communication," October 1971.

TACKLING T.V.I.

(Continued from Page 11)

When all the test results are negative the transmitter can be put on the air at any time with confidence. Neighbouring t.v. sets may need high-pass and/or braid filters, but it is usually wise to wait until neighbours raise the subject. If the Amateur can demonstrate that his own receiver is clear it will be a powerful argument in his favour, and if he has a spare filter at the ready he can soon prove to his neighbour that his trouble is easily curable. If a friendly relationship can be maintained with neighbours and problems sorted out with them, the good name of Amateur Radio will have been promoted and a case of t.v.i. kept out of the official statistics.

This will reduce the total problem and the Amateur will have reached the happy state where he will feel a justifiable pride in having used his licence to learn something, and he will be in a position to encourage and assist other Amateurs to do the same.

REFERENCES

1. "Radio Communication Handbook," chapter 18.
2. "Which Filter?", "Radio Communication," July 1969, p. 470.
3. "How Much Harmonic?", "Radio Communication," May 1969, p. 328.
4. "TVI Tips," "Radio Communication, February 1970, p. 108.
5. "Where TVI is a Problem," "Radio Communication," February 1970, p. 74.
6. "TVI Tips," "Radio Communication," June 1970, p. 383.
7. "Band Pass Filters," "Radio Communication," December 1969, p. 867.
8. "TVI Tips," Radio Communication," April 1970, p. 245.
9. "TVI Tips," "Radio Communication," September 1970, p. 609.

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QSP

(Continued from Page 10)

satellite techniques. Frequencies are 145.85 MHz. input, 435.15 MHz. output, power 1.0 watt, mode F3 plus or minus 10 kHz.

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"For the man who really likes to travel and operate mobile at the same time . . . Tour even has something for him: a VW camper bus fully outfitted to accommodate three or four adults, and fully equipped with a Yaesu FT-101 and Hustler antenna for 80-10 metres." ("CQ" Mar. '72)

CUSTOMS

Work still goes on behind the scenes on this complex subject. Maico Electronics recently applied for By-Law concessions on 420-450 MHz. band mobile f.m. transceivers, but their application was blocked by an Australian manufacturer of similar equipment.

STANDARDS ASSN. OF AUSTRALIA

Recent new standards included 1099 (2nd) electronics testing procedures, 1173 recommended measurement methods on t.v. rx and 1174 radio tx measurements. Draft standards include 1878 on electrotechnological diagrams, charts and tables.

W.A.C. AWARD

This is an I.A.R.U. award. All applications received by the W.I.A. would be forwarded to I.A.R.U. Headquarters to process.

REPEATERS

Census—U.S.A.: 310 (269 on 2 mx), Canada 52 (all on 2 mx). "CQ" Mar. '72.

ARTICLES

Articles are always needed. Short articles are always welcomed, not only as "fillers", but for their own worth.

AN ATTENUATION MARKER

A. J. C. THOMPSON,* VK4AT

This unusual but efficient "Marker" has been a very essential piece of the equipment used on the author's Antenna Farm during the last couple of years.

The "Marker" possesses the ability to record exactly just one particular signal strength and on only one frequency band. This is done as the instrument is moved outwards from an r.f. power source. An identical signal strength can be recorded also in any other direction from that source.

At this QTH it has been used mainly as an indicator, in order to maintain a set output from the transmitter and the antenna.

The transmitter was rated at 120w., the antenna being a 13 element yagi. This attenuation strength (inherent in the marker) gave the following approximate readings:

33 ft. off the end of the driven element.

130 ft. off the other end, but diagonally and across a 14 MHz. yagi of 5 elements.

90 ft. inside the beam.

16 ft. (approx. half way) between the driven element and reflector.

This and similar tests will be discussed later. The merits of this marker are not deemed important in the following notes.

This is an article for the experimenter. It is written from that particular angle and it is intended to be a stepping stone into this interesting field for average minded Amateurs, a class to which the writer belongs.

Even in its present very crude state this attenuation marker has already provided a much-needed and very useful piece of equipment. It is stressed that in this marker, the "pull" from various sources, being all off-frequency ones, must be countered so that eventually they will culminate on the exact frequency of the r.f. power source. In this regard, it differs substantially from the f.s.m. or a household fluorescent tube.

In addition, being very directional, it can be used as an r.f. sniffer on either stray wires or even on different sections of a dipole or vertical.

Basically it is a fluorescent tube with components that force it to work on only one frequency band. At this QTH dud 20w. fluorescent tubes are used. These can be "struck" with a 1w. power source (a g.d.o.) at a distance of up to 5 inches. They will stay alight (hold) to up to 18 inches until it reaches the extinguishing point (drop-out). We will also disregard the power factor and give the actual linear measurements (approx.). Because the drop-out point is so obvious, sensitive and critical, it is from this viewpoint that the following experiments have been made.

The strike position has not been neglected as it is a very handy adjunct at shorter ranges.

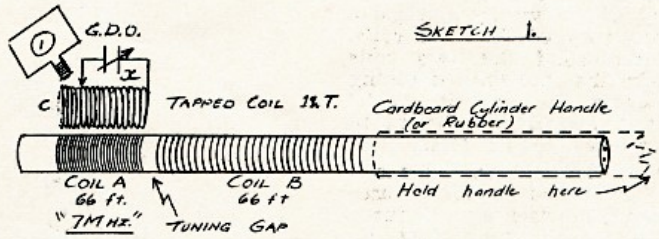
We concentrate now on two very unusual things:

(1) The behaviour of unconnected coils (this appears to have been ignored in the literature at our particular level).

(2) Wave guides on 7 MHz. (our literature mentions this, but regard it as not practicable on that band).

It now becomes necessary to differentiate between the terms wave guides and feed lines. For the purposes of this article we will take Sketch 4. Here we have a feed line E, about 18 inches long. It physically connects 2 turns round the g.d.o. coil, with 2 turns round coil A. This will strike the flourescent tube. If now we remove that gear and use several coils (like Coil A) placed end to end and thus transfer the g.d.o's energy to also strike the tube, then such coils would be termed wave guides.

This project is not foolproof, so "heed this warning". The coils in their final state have to be adjusted under field conditions. In some circumstances they are liable to radiate fiercely. The effect of such rays will not be felt for several hours after the actual burn. The burns are severe especially on already damaged skin. Keep both your unprotected eyes and your hands well clear of the coils at this time. Use an insulated rod or even a wooden ruler. It should be realised that, as with a.c., safe handling depends on a knowledge of the risks involved.



In this project radiation gives no warning, so concentrations of the suitable energy should be either avoided altogether or the necessary precautions taken. In the chain reaction that we are using, a suspicious eye should be cast on the coils and the fluorescent material. With regard to the latter, the writer started these experiments by radiating off the fluorescent coating at the end of a 40w. tube that was just hung on the end of a dipole with 120w. on the transmitter. It will be shown that the adjustment of the coils can and should be done with about 1w. of power or its equivalent in distance from the r.f. power source.

In order to understand what is happening, we start off using low power (a g.d.o.).

Our aim is to use two unconnected coils of 66 ft. in length of wire, wound round our dud fluorescent tube. We want to fire the tube at around 7.1 MHz. but in this case they fire at 5.6 MHz.

It is necessary to have the "pull" of the two coils to each other and to the g.d.o. coil such that the combined result is actually a half wave corresponding to 66 ft. This will also be our transmitter frequency.

Because the pull of the g.d.o. with its tuned circuit has a different effect on coils A and B than a radiating wire antenna, with the transmitter as the power, it is not possible to use the same setting on both occasions.

Another problem is that the maximum distance away obtained for "firing" the tube is not the exact position to give a long distance for the "hold" that leads to the final "drop-out" or extinguishing point.

These three terms will be used here.

Two main defects in the use of a g.d.o. caused a lot of failures:

(1) The tube coils A and B pulled the g.d.o. off frequency.

(2) The maximum output of the g.d.o. coil in use (3.6-8 MHz.) peaked at about 5.6 MHz.

Dozens of coils were wound and tried. By the use of six tubes and using many combinations, the best results were listed and afterwards compared. In all cases where satisfactory results were obtained, the two coils had different electrical lengths but both were half wave (66 ft.) in actual length of wire. In the example shown here, this could be obtained through different gauge, spacing or with the assistance of a tuned circuit:—

	Coil A	Coil B	Gauge
(1)	close w'nd	dble. spac.	similar
(2)	close w'nd	close w'nd	different
(3)	dble. spac.	wide spac.	similar
(4)	close w'nd	dble. spac.	tuned circuit

The simple two-coil arrangement on a dud 20w. tube was chosen because it was neat and very handy to use on the installation at this QTH even in its present crude state. The antennas here are all on 20 ft. poles so the marker can be struck on 4 or 5 of the elements at from 15 ft. to 1 ft. The attenuation drop-out occurs at 30-140 ft. distance in varying directions, using a power of 120w. on the transmitter.

This two-coil arrangement was more difficult to adjust than the others.

No. 4 in the above was the first system worked out and this was used for the first test quoted previously. It was awkward to use, but had the additional advantage of being able to use the tuned circuit as a striker and then to discard this section for the adjustment part.

We take now Sketch 2. Coil A is close wound, Coil B double spaced, the

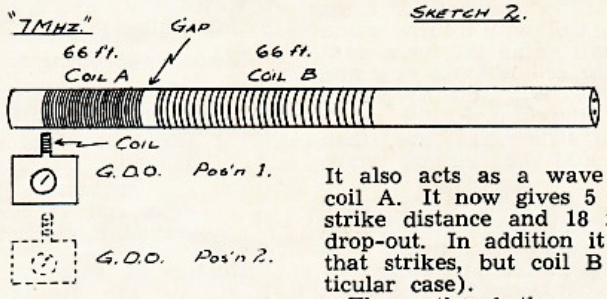
* Skyrings Creek, Pomona, Qld., 4568.

two coils are placed close together. The g.d.o. coil in use is 3.7-8 MHz.

Place the g.d.o. in touching position on the end of coil A and then alter the frequency for the strike. The output of the g.d.o. is poor at 7.1 MHz. and the coil system is not correct, so in this case the firing would occur at about 5.6 MHz.

Now draw the g.d.o. back and forward, as in Sketch 2, noting the distance at which the strike can be made to occur (½ to 2 inches).

Now try in a similar manner for the hold and the drop-out distance. It will have been noted that **the pull changes the g.d.o. frequency for each different distance.**



SKETCH 2.

It is evident then that the exact tuning for maximum strike distance can not be suitable for a good drop-out distance as they occur at different distances. The latter distance may be 2-4 inches. It should be noted that coils A and B pull the g.d.o., with its coil a long way off frequency. They cannot pull a feed line or antenna off frequency. Having noted these peculiarities, it is now necessary to raise the frequency as shown by the g.d.o. up to the frequency of the tube coils. The characteristics of the two coils have to be such that the limited tuning effect of altering the gap ¼" to 2" between coils A and B is sufficient to raise the frequency to 7.1 MHz.

We take now Sketch 1 with the coil data No. 4. The tuned circuit X uses a receiver type condenser and 17 turns of heavy gauge self supporting al. wire tapped at the 12th turn. (It was on hand at the time.) The remaining 5 turns can carry the signal at that frequency in its capacity as a wave guide. This is simply another tuning device.

We have an instrument of sorts now, so we can turn round and use it to test the performance of our g.d.o.

In Sketch 4 the measuring instrument is a f.s.m., the circuit of which is given. At this QTH three different meters were used for these tests. It should be noted that in both this case and in the tuned circuit X of Sketch 1, both condensers prevent striking if they are meshed too far.

Both methods can be used as tuning devices for field work on coils A and B.

The f.s.m. is coupled from the antenna terminals to 2 turns around the centre of coil B. The g.d.o. is coupled to coil A (to influence its usual end) with 2 turns around coil A and 2 turns round the end of the g.d.o. coil. The output at different frequencies is obtained with the adjustment of the condenser and that of the coils.

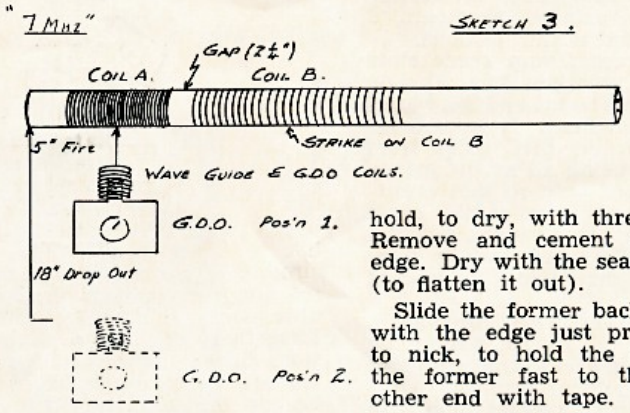
In this test the highest output of 10 mA. was obtained at 5.6 MHz. The output at the desired frequency of 7.1 MHz. was very poor indeed. It is noted that high capacity gives a high reading but it is not suitable for the strike.

The gear around coil A and the g.d.o. can now be removed and similar tests taken to note the influence of the g.d.o. on the tube coils at quite surprising distances.

Now take Sketch 3. This time we test with the g.d.o. and get a normal ½ and 1 inch distance respectively for strike and drop-out at 7.1 MHz. By placing a close wound coil (like coil A) over the g.d.o. coil we force an alteration in the g.d.o. peak frequency.

It also acts as a wave guide toward coil A. It now gives 5 inches for the strike distance and 18 inches for the drop-out. In addition it is not coil A that strikes, but coil B (in this particular case).

The path of the energy from the g.d.o. to coil B is: 18 inches from the wave guide of the g.d.o. to coil A, through that coil and a gap of 2¼ inches and only then does it fire or drop-out at coil B. The phenomena of coil A acting as a wave guide is quite usual. By altering the frequency (as an example) the wave-guide effect can switch from one coil to another.



SKETCH 3.

Better results could be obtained if the g.d.o. and the wave guide were better balanced up. We should by now have had a bit of practice in adjusting these things in order to work exactly on 7.1 MHz. if required. It should have been noted that we have here a very silent method of firing a fluorescent tube, and a very economical way of keeping it just alight. You will find also that with the aid of a fluorescent tube hung on the end of a dipole and by using a Gamma-match you can turn the fluorescent up and down just like using the wick on a lamp. It turns your plate meter up and down too, if you don't watch out. The same effect is obtained by altering the frequency on the g.d.o. in Sketch 2. We now have to adjust these coils for actual use. Our aim is a long drop-out figure.

The lead to a dummy load is good for a start. The aim (preferably) is for a "low" glow in coil B, using coil A for the strike and adjusting the gap while quite a distance away from the lead. The tube itself is held at the coil B end but using a thick insulation such as rubber. This will also give a steady capacity to ground. The upright position is usually best as it is very directive. (It can be used as an r.f. sniffer.) The writer prefers to have several different types of half wave coils and has also a couple of tubes with one permanent winding right on the glass. It doesn't take long to find a pair of coils that match up.

For using the strike part, an egg insulator on the element end makes a good pulley. The tube is hauled up in an upright position by bricklayer's nylon string and if suitably placed will indicate that a certain strength was there. As previously shown, the power drain is slight for strike and much less for the hold. The ordinary fluorescent tube can be used for very strong outputs and is not frequency conscious.

WINDING THE COILS

We deal now with a method of winding the necessary 66 ft. of wire on to a detachable former. The method is easy and the product will not fall to bits. These coils have to be interchangeable. Tubes vary slightly in diameter. A medium grade of sandpaper is good. (The writer uses several tubes with one winding fixed on the glass itself.) Wrap the sandpaper round the tube, sandside inside, for 1¼ turns. Cement along the edges and hold, to dry, with three rubber bands. Remove and cement along the inner edge. Dry with the seam on the bottom (to flatten it out).

Slide the former back on to the tube with the edge just protruding enough to nick, to hold the first turn. Hold the former fast to the glass at the other end with tape.

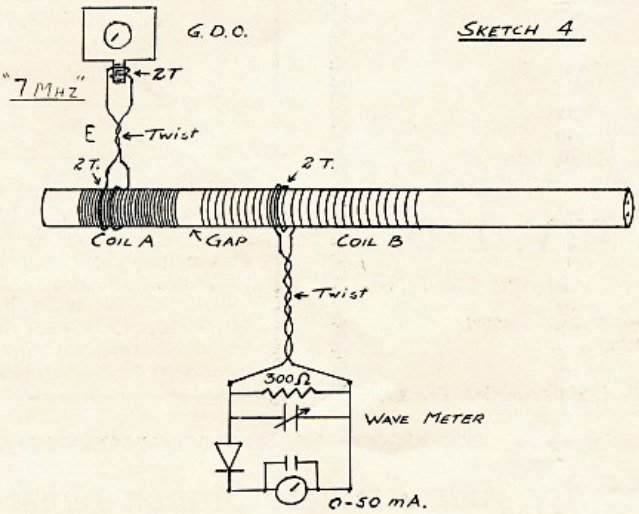
We have now to wind 66 ft. of wire on to each of the two formers required. Several coils of different electrical lengths (but all 66 ft. long) should be wound for this band. We will take the coil data from (1) which is a single and a double spaced coil. Excellent wire can be obtained from defunct genemotors and large step-down transformers.

For coil A stretch out 70 ft. of wire attached to a nail. Have a marked loop 2 ft. from each end. This 2 ft. and probably an inch of the former, is to be sacrificed in order to get a firm cut close to the coil proper. Have some short pieces of sticking tape attached to the glass in case of emergencies. The first few turns can be overwound and taped for firmness.

Wind the wire in the same direction each time, taking care not to pull too

tightly. For right to left winding, rotate the tube with the right hand, in an anti-clockwise direction with a guiding thumb being parallel to the tube. Spread the final 2 feet. Cement round the "former" where the knife will cut and then again in four places lengthwise, to hold the wires in position. Cut and discard the 2 ft. of wire at each end together with the surplus former. Should any end-winding come loose use half an inch of narrow tape both inside and then outside to hold it.

Coil B has twice the length of wire, it being hooked over a nail in the middle, to keep the winding tension equal. It is close wound, using two wires, in the same manner. When complete, unwind one of the two wires. If the wires have been crossed over, it is easiest to cut the wire each time it has been crossed over.



SKETCH 4

PRACTICAL APPLICATION

We will deal now with its practical application. Two quite unusual effects came in the use of a multiband and a vertical. The multiband was an off-centre fed affair. It was a very indifferent performer over several years. With the present set-up (in the direction of Adelaide) it suddenly behaved with such efficiency the writer was afraid to alter or touch it for six months. Visiting Amateurs all agreed that it had more things wrong with it than any antenna they had ever seen. Very recently an effort was made to find out just what made it tick.

Sketch 6 gives the layout. The multiband (used only on 7 MHz.) is placed between two 16 ft. sections on one end (west) and the reflector of the yagi beam on the other end (east). This part of the experiment failed, as it over-ran the first egg insulator on the west and had no effect on the reflector on the east. Using the attenuation marker, it was struck on the feed line, and then the varying intensity of the fluorescence was an indication of the intensity of the r.f. It was easily seen that the feed line (300 ohm t.v. line) F-G-H was radiating from F to G (half wave 66 ft.) but not G to H (16 ft.). This latter was inside the shack to the transmitter. A hunt for the cause of such a curious state of affairs revealed that a discarded quarter wave feed line, of 300 ohms, was coiled at the point G. The remaining wire crossed via the rafters to the earth at the opposite end. It had good r.f. all the way. It was then ascertained that the multiband, section B, radiated not at all (like a reflector). The other section A had some r.f.

The next test was for the distance away for the strike to occur. It gave 6 ft. at F and G and 1 ft. at C. Lastly, the hold position was tried to give the drop-out distance. From the point F it was 70 ft. to the N. and 40 ft. S. At this stage it was decided to see what happens when two antennas are energised at the same time. (The writer does it this way when changing over to a different antenna.)

It will be seen in Sketch 6 that the transmitter with 3 ft. of co-ax would have 66 ft. of 300 ohm line to the yagi beam on one side and then 16 ft. plus 66 ft. on the other side (this latter section would **radiate**). On test, the multiband was the same, only the output was down a little, but the yagi beam did not radiate at all, nor did the reflector work. However, the feed line radiated. It was strange to see the dimly lighted tube pass right under the reflector without blanking out. The drop-out occurred at 70 ft. to the N. and, although not recorded, about the same to the S. The two feed lines were in series and almost centre-fed by the 3 ft. of co-ax.

We deal now with a vertical which acted very queerly. It is seen in Sketch 5. The pole used was 40 ft. high. Section X was a standard type vertical taken from a text book. It consists of 300 ohm t.v. line with the two wires at the top soldered together. The length is 33 ft. The bottom two wires were connected, one to earth and the other through a tuning unit at the base to a co-ax. lead-in. It loaded up well and did radiate but the reports were not good. Under the following circumstances it ceased to radiate, but apparently became a wave guide instead.

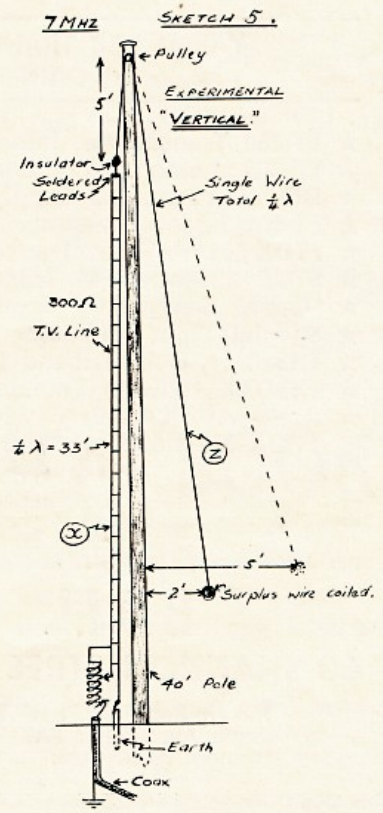
The wire that did radiate is marked Z. It is a stranded wire clothes-line type. It is separated by the insulator from the two-wire 300 ohm section. (The distance was not recorded, but would be between 1 and 5 inches.) This single wire goes up 5 ft. then round the pulley and down to total 33 ft. At this point the surplus wire was scrambled into a ball where it hung 2 ft. out from the pole. Using 120w. on a.m. it gave strength 8 in Sydney (in a single test) against 9 by the yagi beam.

The attenuation marker gave the drop-out point as 70 ft. as against the yagi 130 ft. On the strike the fluorescence showed unduly strong on the bottom where this ball hung, but was lighter higher up. The strike and drop-out tests on the standard section of 300 ohm line showed no radiation over quite a large sector beyond 6 ft. away. The line Z was then shifted until the single wire Z was 5 ft. away at the end. In this new position it ceased to radiate, but the other section X then radiated.

It should be noted that the writer uses the term wave guide for the coils, but in this case and also in the multiband, the section that should have radiated but didn't had also all the symptoms of being a reflector (under test).

CONCLUSIONS

In the cause of simplicity, linear measurements have been quoted. However, the principle concerned here is the "inverse square law of light". Certain factors prevent it from applying here 100%. With yagi beam, the drop-out attenuation point will always be between two of the directors (in this case 90 or 140 ft.). A beam of this kind contains more energy than is put into it. It is believed to come in from the sides. In addition, the strength of say director 5 is less than at director 4,



TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

Manuscripts should preferably be typewritten but if handwritten please double space the writing. If possible collaborate with any local draughtsman, student or engineer to do illustrations after the method shown in "A.R.," May 1971, page 5. Otherwise drawings will be done by "A.R." staff.

Please address all articles to:
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REMINDER **REMINDER**

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but director 5 would be stronger than at the half-way point between them.

Einstein's Law of Relativity would suggest that the square law of light would fix the relative strengths between adjacent elements rather than the distance from the r.f. source itself. This point the writer saw demonstrated with the aid of a 14 MHz. two element yagi, a transmitter power of 120w., and an ordinary household 40w. fluorescent tube. If the director was just close enough so that the fluorescent tube could just pass the approx. half-way point, then the fluorescence **increased** with the distance **away** from the source up to the director. Another factor that we have to consider is that we are not looking at "light". We are seeing the effect that light has on a certain substance.

The writer has found that much fresh information is obtained on the behaviour of antennas just by using an instrument that is based on a different principle.

In the actual experimental work at this stage and at this QTH the course to be followed would be to take the unusual features in both the vertical (Sketch 5) and the multiband (Sketch 6), then reproduce the same conditions.

By an elimination process it would be hoped to eventually arrive at the correct solution. Results of single tests, as set out in the diagrams, are seldom reliable, but if any unusual features "tie in" with tests from other sources, as in this case, then further investigation would be in order.

With regard to the attenuation marker itself, the next logical step would be the calibration.

It may be recollected that in the power tests with the g.d.o. (Sketch 4) the actual strike itself occurs, not at the high power point but at the low. In addition, at the actual strike moment itself, apparently a complete phase reversal effect occurs that immobilises the g.d.o. meter, yet it apparently operated normally on the harmonics. This characteristic itself can be used as an indicator in daylight hours by using the meter to indicate the presence of fluorescence.

A perusal of suitable text books on the relevant subject brings forth the following information which is very briefly stated.

In fluorescent tubes we see not light itself but the effect of light on a material.

It is only luminence intensity that stimulates the eye, particularly in the yellow-green part of the spectrum. Actually it is the work done by light. The chemical substance in the fluorescent tube becomes luminescent when bombarded by electrons. The light is produced by the conversion of part of their kinetic energy into light energy.

We have two factors here:—

(1) The density of the electrons striking the material,

(2) Their velocity.

In photography we must add the time factor also.

For experimental purposes it is assumed that if any clearly defined differences can be created then we have a good basis for measurements.

In the present instance with this attenuation marker we have several co-related clearly defined points:—

(1) The linear measurements for the strike;

(2) The linear measurements for the drop-out;

(3) The moment of the phase reversal as registered by the g.d.o. meter.

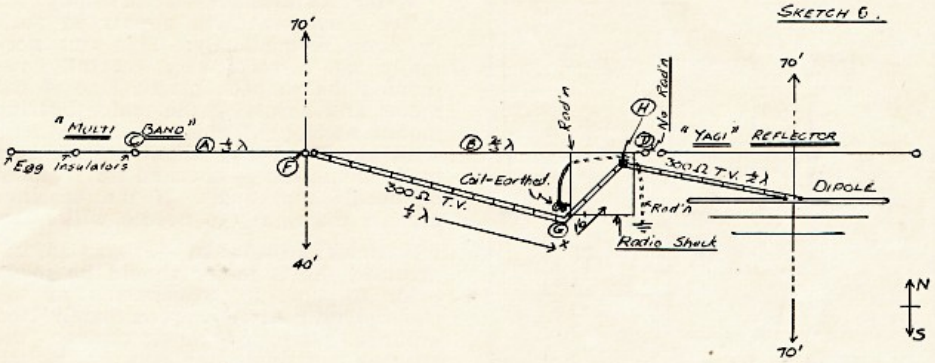
Less clearly defined are:—

(1) The action of the various kinds of fluorescence materials.

(2) The difference between (a) a sodium vapour lamp (which follows the rise and fall in the a.c. voltage to within 90%); (b) a 40w. fluorescent tube (which alters only about 20% similarly).

We have also, the oretically. The "inverse square law of light," as it applies to the full and half power results in actual practice.

As this law applies "in a vacuum" it does not necessarily limit the speed of the electrons in the magnetic field to that in the electrostatic field.



It is trusted that these remarks on the importance of our instrument upgrading will channel experimental work into this particular field of research.

While waiting for this article to be typed, the writer re-tested Sketch 4, but this time for "phase" purposes. The strike occurs at maximum instead of minimum. It will be remembered that while in the strike position both meters were immobilised, yet they showed some activity on harmonics. Evidently then either the meters did not work while the tube was luminscent or else the meter's indication of no current was correct.

The method of test and the results are as follows:—

A narrow strip of sandpaper, the width of the space between the coils, was placed there, to prevent the tape from sticking to the glass tube. Tape was applied to it and the adjacent end of each coil so that the glass tube could be removed without altering the relationship of the coils to each other.

With the tube removed, the g.d.o. dial was rotated from 3.7-8 MHz. Maximum and minimum points, together with their frequencies, were noted. The most efficient spot appeared to be in the centre of the coil.

The tube was then re-inserted. The dial was again rotated, first from the 3.7 MHz. end to the maximum point of 13 mA., where the tube fired, then (in this instance) from the 8 MHz. end to a maximum at 8 mA. where it did **not** fire, then down and up to the maximum point of 13 mA. where it **did** fire.

Of particular interest is the fact that it fired at the maximum point as indicated by the meter, yet it was the minimum point as registered by the luminescence. This was indicated because the luminescence increased as the g.d.o. dial was rotated to either end. The meters gave no indication of this phenomena either.

These tests would appear to indicate that (1) the current flow through the coils cease at the moment of the strike, (2) the total energy contained in the coils is absorbed by the tube-gas and the luminescent material, (3) a phase change occurs at that point. This turning of the luminescence up and down by this method reminded the writer of the text book method of doing the same job.

There they operate on the 50 cycle a.c. with two thyratrons. These are used to cut off the voltage for a period in each cycle. The "persistence" factor of the flourescence material saves the tube from extinguishing during the voltage cut-off period.

In this last experiment, two points are of interest:—

(1) A clear-cut indication of fluorescence is given, by the meter registering the on and off currents.

(2) The fluorescence is quick enough to save a germanium diode while using a transmitter instead of the g.d.o.

Commercial Kinks

Last month I started this series off with a few hints on receivers. This time I will continue our discussion on audio a.g.c. as applied to old or to some of the newer low priced receivers. Also a few notes on the Galaxy transceivers.

AUDIO DERIVED A.G.C. FOR S.S.B. ON OLD RECEIVERS

Anyway, let's get under way by returning to the problem of reasonable sideband reception. I think perhaps I raised a few eyebrows when I stated that stability and selectivity were not quite the important things that S.w.l's needed.

It has seemed to me for a long time now that the most infuriating thing about tuning s.s.b. is the constant adjustment of the r.f. gain control.

The circuit in Fig. 1 has proved to be the answer in several widely different receivers.

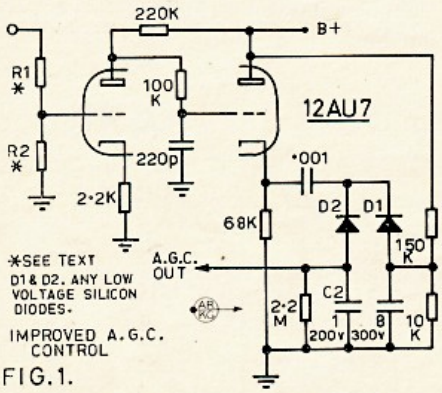


FIG.1.

The input to R1 goes to the hot end of the audio gain control, and the ratio of R1 to R2 sets the amount of a.g.c. voltage developed.

You can also adjust the value of C2 to obtain any amount of delay that you require on the a.g.c. decay.

I suggest that the normal a.g.c. be left in for a.m. reception, and that you use the audio derived a.g.c. for sideband and c.w. only. The high voltage is not critical and anything from 100 to 300 volts will be fine.

The complete unit can be built up on a small scrap of aluminium and tucked in under the receiver chassis, so you should not need to modify the actual set in any way. By the way, don't forget to copy out the circuit and pin it in the instruction book. This will not only help you in the future, but also any new owner to whom you might sell the set.

GALAXY RECEIVERS

Considering that these units first came on the Australian market early in 1964, and sold at something just over £200 for the III., they still command a very good price on the secondhand market, if you can find one.

Over the years most of them have given very little trouble to their owners. Probably the worst fault found in them has been faulty soldering in the 9 MHz. filter. It takes a brave man to open one of these up, but most of those who have, have been rewarded with success. Symptoms of a faulty filter are low transmitter output coupled with generally poor transmitted audio quality. However, check out all the other possibilities before you open up the filter.

Galaxy have supplied some service information on the early three and five-band units that would be worth adding to your files.

Bias Adjustment.—It is recommended that the Galaxy III. and V. bias be adjusted by placing the function switch in the c.w. position, with the mike gain control full counter clockwise (off position) and the sideband selector in SB-1. The bias should be adjusted midway between 4 and 5 on the meter scale.

This adjustment should be checked periodically and re-adjusted if necessary. Older instruction books recommend a lower setting than this. The newer setting will give better p.a. tube linearity and the audio quality should be better.

Meter Adjustment.—Occasionally the meter movement will appear to stick or hang momentarily. This can normally be corrected by carefully removing the snap-on plastic face of the meter and adjusting the meter bearing mount assembly. This should be done with care and any slight adjustments made should be re-checked for freedom of needle movement. If the bearings are set too tight the needle will hang.

S Meter Adjustment.—Proper adjustment of the S meter should be made prior to tune-up adjustments of the transceiver. After approximately ten minutes warm-up time, remove the antenna and place the function switch to p.t.t. position. R.f. gain control must be fully on. Adjust R2 control (on top of chassis near the dial light) for a zero setting.

One other problem with the early Galaxy that has come to my notice is a spurious signal output on 80 and 20 metres. Our own "A.R." Editor reports this one on his III. It appears that the spacing of the spurious from the wanted signal changes at twice the normal tuning rate, which would suggest that maybe the second harmonic of the v.f.o. is beating against something. If you have any ideas on this, perhaps you could let us know here at "A.R."

Next month I will continue with transceivers on a more general theme. I am also working on a run down of problems, modifications and ideas in general on the famous FT200. Perhaps you would like to add a few of your ideas. Don't be backward, let's have them.

— · · · —

AFTER-THOUGHTS

"A Drop of Home Brew," page 5 of Feb. '72 "A.R.," top left section of key. The dimension between the pivot and the front contact should read 1½" and **not** 2" as shown. Please amend your copy now.

ROSS HULL V.H.F. CONTEST, 1971-1972 RESULTS

This year's contest is noteworthy because of the narrow margin between the winner VK5SU, and the runner-up VK4RO, also their excellent scores. Congratulations Kerry and Ross, who was so close, on your fine efforts.

Last year's winner, Don VK4ZFB, was not far behind with Joe VK7ZGJ in fourth place.

Don VK4ZFB got into the picture as winner of the 48-hour section, while Bob VK3AOT listed the greatest number of scoring contacts.

With such a narrow winning margin, detailed cross checking was necessary, but this was limited, by the number of logs returned, to a small percentage of the winning log. Part logs contributed to the problem.

If you give numbers in a contest **please** return a log, be it ever so small. If you don't want your score listed, just mark your log "check log only".

I appreciated, and many of the contestants also appreciated, the table of distances provided by Derek VK3AVW, which assisted me immeasurably.

You will note that the number of logs returned is down on last year, and that only 16 limited licensees returned logs in a contest which I thought would have been their "piece of cake".

It appears that we should investigate national contests and by participation or new ideas give these contests a boost.

You, individually or collectively, give me the ideas and I will sort them out to what the majority appear to want.

Let us have a good return for next year's contest.

VK5SU and VK4RO logged 6 metres only for scoring, not many logged 2 metres, VK5ZTN logged 2 metres only, and VK5ZMJ only logged 70 cm. It was almost a 6 metre contest.

The standard of logs was good.

Thanks to those who included comments, to which I will reply.

—Peter VK4PJ.

TROPHY WINNER

VK5SU—J. W. K. Adams

48-HOUR CERTIFICATE

VK4ZFB—D. F. Blanch

Section (a)—Transmitting, Open

	Best 7-Day Score	Best 48-Hour Score	No. of Log Scoring Contacts
VK7JV	277	161	22

Section (b)—Transmitting, Phone

	Best 7-Day Score	Best 48-Hour Score	No. of Log Scoring Contacts
VK2BHO	1329	584	111
2ZSC	955	430	81
2ZQJ	934	417	71
2HZ	496	126	40
2BMX	490	140	54
2ATQ	318	181	27
VK3AOT	1290	441	445
3KU	677	181	87
3BFG	612	184	123
3AMK	596	210	132
3ZYO	521	—	145
3YEJ	458	96	45
3ALK	307	—	40
3ANP	171	—	16
3ZXB	153	72	18
VK4RO	3171	855	216
4ZFB	2841	967	210
4ZGA	1075	230	117
4ZBH	75	75	4
VK5SU	3206	1260	263
5ZMJ	1565	650	123
5ZTN	601	601	35
5ZGF/8	885	510	66
VK6ZAA	1115	528	70
6XY	972	315	34
6ZCD	810	280	75
6PD	578	—	59
6ZFF	Check Log		
VK7ZGJ	2674	791	212
7KJ	535	201	66
7AX	280	—	27
VK8ZGF	Refer VK5ZGF.		
VK9ZAP	155	155	7
ZL3RZ	1830	1080	103

Section (c)—Transmitting, CW

No Entry.

Section (d)—Receiving, Open

L50088—S. Ruediger .. .. 1164 pts.

☆

TRADE INFORMATION

From Lockheed Aircraft Corp. via Infoplan, P.R., in Sydney, comes news of the development of batteries producing electrical power from the controlled reactions with water of alkaline metals such as sodium or lithium.

* * *

The University of New South Wales has drawn attention to the operation of professional education by tape correspondence in their post-graduate extension studies programme in operation for the last nine years.

* * *

News from the Australian Broadcasting Control Board is that Mr. J. Wilkinson, formerly Assistant Director-General (Radio) in the P.M.G's Dept., has taken over the position in the Board of Controller, Technical Services Division arising out of the personal request, for health reasons, of the transfer of Mr. Brownless to another Branch.

* * *

Another item to hand is a brochure from Fairchild Australia Pty. Ltd. entitled "Ban the uA776" and containing details of their ICs.

SLOW-SCAN T.V. CLUB

A Slow-Scan Television Group will be launched as a division of the Eastern and Mountain District Radio Club and all interested Amateurs and S.w.l's should attend the first meeting to be held on Friday evening, 7th April, 1972, at the Mooroolbark Technical School, Reay Road, Mooroolbark, at 8 p.m.

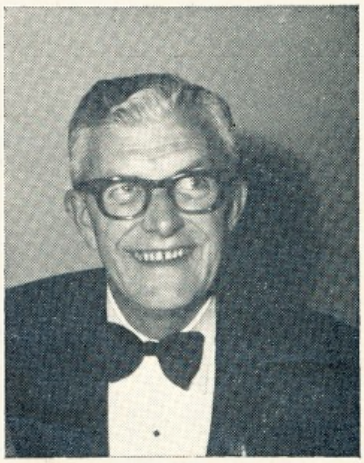
If you are a current financial member of the E. & M.D.R.C., no further membership fees are required, however other interested Amateurs and S.w.l's can become full members by joining the Eastern and Mountain District Radio Club. Membership fees are:

Full membership, $3 p.a. and 50c. joining fee.

Junior membership (under 18 years), $1 p.a. and 25c joining fee.

Pensioner membership, $1 p.a. and 25c joining fee.

Postal Notes, Money Orders or Cheques should be made payable to the Eastern and Mountain District Radio Club and sent to the Secretary, Reg Durrant, P.O. Box 87, Mitcham, 3132. Please endorse your letter "Slow-Scan".



OBITUARY

MAJOR W. (BILL) T. S. MITCHELL, VK3UM

Amateurs, both in Australia and overseas will be saddened to learn of the sudden death of Bill Mitchell, VK3UM, on 3rd February last.

Bill obtained his licence in 1937 and his prime operating interest was c.w. with a preference for DX working. However, he took a break from DX in 1939 during the notorious Victorian bushfires of that year when he actively assisted in providing communications from some of the worst stricken areas.

After the second world war, Bill became involved in the administration work of the W.I.A. at a Federal level and served in one capacity or other on the Federal Executive for nearly 16 years—from 1947 to 1966, with a short break in 1950 to 1953 when he served in the United Kingdom. In his time on Executive, Bill held positions as Federal Secretary from 1947 to 1950 and as Federal President of the W.I.A. from 1955 to 1957 and again from 1962 to 1964. At other times he served as Federal Business Manager and Federal Vice-President.

Although not very active in recent years, Bill had, like many of the old-time c.w. men, succumbed to the fascination of s.s.b. techniques and had used this mode of transmission latterly, although his main love remained c.w.

He leaves a wife and four children, and to them, members of the W.I.A. express sympathy in their loss.

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
1481	UW0LI	1483	UW0LR	1486	UA0LZ
1482	UW0FP	1484	UO5AP	1487	DL6WE
		1485	UK5MAA		

This completes the issue of Cook Bi-Centenary Awards. Applications were received from over 100 different countries and a total of 1,527 Certificates issued, 1,487 were issued for h.f. operation and 40 were issued for v.h.f./u.h.f. operation.

INTRUDER WATCH SUMMARY

OCTOBER TO DECEMBER, 1971, INCLUSIVE

Frequency kHz.	Mode	Average Time GMT	Identification	Traffic and Remarks	Reported by VKs
28020	A1	0700	CN5	CN5 repeated	4KX
27125	A3	0800	——	CB unlicensed this frequency	3ASV
21004	A1	0600	2FB	2FB repeated	4KX
21005	A1	1230	BNJ	BNJ repeated (China)	4KX
*21005	A1	1030	7A1	7A1 repeated (Indonesia)	4KX
21014-5	A1	1100	HXG38	HXG38 repeated	4KX
21015	A1	0130	G7M	G7M five-figure code	4KX
21015	A1	0830	HGX37	HGX21 de HGX37	4KX
21017	A1	0700	SERI	SERI repeated	4KX
21020	Multiplex	0030	——	Operates continuous daily	4PB
21020	A1	0200	UWAK	HZUK de UWAK	4KX
21030	A1	0300	WTSH	PREG de WTSH	4PB
21040	A1	1030	HZUA	HZUK de HZUA	4KX
21050	Multiplex	0200	——	Operates continuous daily	4PB
21050	A1	1100	HZUAA	HZUK de HZUAA	4KX
21078	A1	1000	HZUA	HZUG de HZUA	4KX
21095	Multiplex	0200	——	Operates continuous daily	4PB
21101	A1	1030	HZUA	——	4KX
*21130	A1	0900	P7F	P7F repeated	4KX
14003	A1	0800	JTW	FCL, JTW	8HA
14003	A1	0830	BTW	BTW repeated	8HA
14004	A1	1300	XMWD	——	8HA
14004	A1	1000	9VA1	9VA1 repeated	4KX
14011	A3	1230	——	"calling for rx tuning 1 2 3-10"	4KX
14013	F1	2100	——	RTTY	2ZO
14016	A1	0730	PSEX	——	8HA
14021	A1	1115	NRJG	——	4KX
14027	A1	0700	53IU	——	8HA
14029	A1	0700	E9SF	M2MB de E9SF	8HA
14030	A1	0600	GYR3/4/5	CQ de GYR3/4/5 (Malta)	4PB
14032	A3	0400	Kupang	Telephone link testing, Kupang to Sourabaja (Indonesia)	8HA
*14037-41	A1	0900	PBJ	R9PH 53IU J9MW de PBJ (Indon.)	4KX, 8HA
14039	A1	1000	UXMA	RCC7 de UXMA	4KX
14040	F1	1500	YBU	Morse then RTTY	4KX
14041	A1	2300	YBU	——	8HA
*14050	A1	1200	PKD	CQ de PKD (Indonesia)	4PB
14052	A1	0900	XFG	XFME de XFG	4KX
14053	A1	0900	ZYI	ZYI repeated	4KX
*14054	A1	0830	7BD4	7BD4 (Indonesia)	8HA
*14055	A1	0630	8IUP	8IUP (Indonesia)	8HA
*14056	A1	0630	7BD4	7BD4 (Indonesia)	8HA
14050	A1	1000	ROD28	ZM4 de ROD28	4KX
14060	A1	0600	UCKT	UXCZ de UCKT	4KX
14062	A1	0020	GYF	GYF repeated	4KX
14063	A3	2300	Peking	Broadcast, Radio Peking	8HA
14067	A1	0730	N2FU	RX22 de N2FU	8HA
14069	A1	0630	ZWKA	——	4KX
14065-9	A1	0700	N2FU	FRNL de N2FU	4KX
14075	A1	1100	H34S	——	4KX
14076	A1	1200	OZTV	——	4KX
14077	A1	1030	WNP8	BLEC de WNP8	4KX
14079	A1	0900	UJA	UJA (Soviet)	4KX
*14079	A1	1030	YGL	YGL repeated (Indonesia)	8HA
14080	A1	1030	ETUA	ETUA heard for months passing traffic	8HA
14084	A1	0700	BXM	——	8HA
14103	F1	2100	——	RTTY	2ZO
14140	A4	1000	——	Foochow Helles Schrieber Facsimile	2ZO, 3ASV
14145	F1	2100	——	RTTY	2ZO
14150	A7A	1000	——	Multi channel	4NF
14150	F1	1230	ZHUV	Morse and RTTY	4KX
14198	A3	1500	Moscow	Broadcast, Radio Moscow	4UC
14204	A1	0900	——	Vs	3ASV
14223	A3	2300	——	Broadcast	4NF
14275	A1	1330	QOHR	——	4KX
7005	A3	1030	DU9LT	Broadcast in English by foreigner	2ZO, 4KX
7015	F1	2000	——	RTTY	4NB
7010	A3	2000	——	Broadcast, German announcer	8HA
7011	A1	1400	NUJ	NUJ repeated	4KX
7016	A3	2000	Peking	Broadcast, Radio Peking	2ZO
7020	A3	2000	——	Broadcast	2ZO
7028	A3	1930	——	Broadcast	4NB, 8HA
7028	A1	1000	QKW3	5VN8 de QKW3	4KX
7030	A3	1930	——	AQQT de K7XG	4KX
7035	A3	2100	Peking	AQQT de K7XG	4KX
7040	A1	1300	K7XG	Broadcast	8HA
7048-54	A1	1900	K7XG	Broadcast with jammer	2ZO, 8HA
7050	A3	2100	——	Broadcast, foreign language	2ZO
7064-5	A3	0600	Tirana	Broadcast, Radio Tirana, (Albania)	2ZO, 4NB
7075	A3	2000	——	Broadcast, foreign language	2ZO
7090	A3	0630	——	Broadcast, foreign language	4NB
7095	A3	1000	Peking	Broadcast with jammer	2ZO, 4NB
7098	A3	2000	——	Broadcast, foreign language	2ZO

Note: Jammers occupy most of the band jamming Radio Peking, and are worse than the broadcasts.

3528 3530 3554 3535 3549	A3	2230	——	Two-way telephone. Thought to be Japanese fishing vessels	3TX
3545	A1	1900	URD	——	4KX
3600	F4	0830	——	Chinese facsimile	4KX

* Indonesian tactical army stations are becoming more and more numerous.

—Alf W. Chandler, VK3LC, Intruder Watch Co-ordinator for W.I.A.

DIVISIONAL NOTES

NEW SOUTH WALES

MORSE TAPE SERVICE

The VK2 Morse Tape Service will be closed until early April when it will be operated from a new location. The new address will be advised as soon as possible and until such time please return tapes or forward requests to 93 Kingdon St., Scone, 2337. As there will be no tapes to hand for a period none can be forwarded, but requests for information will be answered and any orders for tapes will be held and filled as soon as tapes come to hand. —Max. Francis.

BALANCE SHEET

As at 31st December, 1970

Accumulated Funds:		
Balance, 1/3/70		$40,729
Add Excess of Income over Exp.		229
		$40,958
Special Funds:		
Club	$441	
Dural Equipment	298	
J. R. Corbin Trophy	13	
Library	148	
J. W. Miller	2	
	902	
Capital Reserve:		
Land and Buildings Revaluation		39,161
		$81,021
Represented by—		
Current Assets:		
Cash on hand		$50
Bank of New South Wales		1,213
Fixed Deposits		4,192
Sundry Debtors		609
Stock on hand		488
Prepayments		161
		$6,713
Less		
Current Liabilities and Provisions:		
Sundry Creditors and Accrued Charges	$430	
Subscriptions paid in advance	1,816	
Class Fees paid in advance	566	
		$2,812
		$3,901
Fixed Assets—at Valuation:		
Plant, Equipment, Furniture and Fittings	$11,111	
Less Accumulated Depreciation	7,841	
	$3,270	
Land & Buildings—Dural	12,650	
Crows Nest	61,200	
		77,120
		$81,021

I have examined the accounts of the Wireless Institute of Australia (N.S.W. Division) for the ten months to 31st December, 1970, and report that in my opinion the Balance Sheet and Income and Expenditure Account are properly drawn up so as to give a true and fair view of the state of the Institute's affairs and of its results for the year then ended. The accounting and other records examined by me are properly kept.

Sydney, 1st February, 1972.

(Sgd.) Dan Lawrence.
Chartered Accountant.
Registered under the Public Accountants, Registration Act, 1945, as amended.

INCOME AND EXPENDITURE ACCOUNT

For 10 Months ended 31st December, 1970

Income—		
Membership Subscriptions and Entrance Fees		$8,976
Trading		245
Educational		1,412
Group Activities:		
Surpluses—W.I.C.E.N.	$464	
Less Losses—Y.R.S.	130	
		334
Sundry Income:		
Bank Interest	$227	
Miscellaneous	158	
		385
		$11,352
Less **Expenditure—**		
Crows Nest Property:		
Electricity and Gas	$156	
Rates	514	
Telephone	121	
		$791
Dural Property:		
Electricity	$9	
Rates	123	
Telephone	52	
		184
Operating Expenses:		
Salaries paid	$2,411	
"Amateur Radio"	3,294	
Insurance	242	
Office Expenses	1,333	
Depreciation	663	
Per Capita and Convention Expenses	1,462	
Travelling and Entertainment	153	
Divisional Grants	43	
Annual Dinner and Convention	286	
General Expenses	31	
Audit and Accountancy Fees	150	
Miscellaneous Expenses	80	
		10,148
		$11,123

VICTORIA

Most of the news this month concerns two Conventions which will be occurring at Easter. The Federal Convention this year is in Melbourne and a welcome is extended to all delegates to this. As well as the formal sessions there will be informal activities with the Convention Dinner being held on the ship "The Argonaut" and a barbecue at the home of the Victorian Federal Councillor, John Battrick, at Frankston.

The V.h.f. Group will be holding their annual Convention at Wandin East on Saturday, April 1, and Sunday, April 2. This convention is a reasonably informal affair with plenty of activities and the opportunity to meet your fellow Amateurs.

Many Victorian Amateurs appear to be taking up facsimile transmission and mechanical scanning slow-scan television. Many interesting developments have taken place. A very good display of facsimile was recently given by the Eastern and Mountain District Radio Club at an exhibition in Lilydale. This club will also be sponsoring a special interest group which should be meeting during this month.

This month the Victorian Division holds their elections for Council and the Annual General Meeting will take place on the 5th April.

SOUTH AUSTRALIA

February, as usual, saw the A.G.M. For the first time since 1965, we had sufficient Council nominations for an election, which pleased everybody. According to the Constitution, the new Council elects its office-bearers so this took place at a Special Council meeting the following Friday after the A.G.M.

President/Fed. Councillor: Geoff VK5TY.
Vice-Presidents: Rob VK5RG and Marshall VK5QO.
Secretary: Ross VK5KF.
Treasurer: Tom VK5TL.
Minute Secretary: Jim VK5NB.
VK5WI Operator: Colin VK5XY.
Associates' Representative: Tom Hannaford.
Other Council members: John VK5UL, Arn VK5XV, Bart VK5GZ.

The other office-bearers remain substantially with their previous holders; to save space, further details will appear in the local journal.

The V.h.f. Section also held its A.G.M. in February to a very gratifying attendance. During quite a lively meeting, the following officers were elected: Chairman, Ian VK5ZIP; Vice-Chairman, Leith VK5QH; Sec./Treas.: Bevan VK5ZBB; Committee members: Garry VK5ZK, Steve VK5ZNJ, Colin VK5ZHJ, Kevin VK5ZKT, John VK5QZ.

From what I have gleaned, the year's programme should be quite interesting, since several projects are being examined.

The main April activity is a repeat performance of last year's prenomonal Swap-and-Shop. This will be held in the same location behind the Repco Building, King William St., Adelaide, on Sunday, 16th April, in the afternoon. Bring along your good gear, old gear or any gear, rent a table and go for your best, sell it yourself and have a good time. Last year's was an extremely popular event, so come and meet the rest of the gang.

Remember, this month's meeting is on a Wednesday.—Bart VK5GZ.

EVENTS CALENDAR

31st Mar.-2nd Apr.—Federal Convention, Melbourne, Zebra Motel Conference Room, Parkville.

6th Apr.—VK5 V.h.f. Section Meeting.

16th Apr.—VK5 Swap-N-Shop (see advert.).

26th Apr.—VK5 Div. Mtg.

INTRUDER WATCH REPORT

Through the vigilance and courtesy of VK4NP I have received a comprehensive read-out of teletype heard on our 14 MHz. Amateur band.

There are reams and reams of "RYR RYR RYR . . ." (if you have noted my identification tape you will remember the "trilling your tongue" type signal) demonstrating how the station occupies the frequency between traffic. The identification of the station gives a call sign of "TCX", it sends at a speed of 45.5 bauds, has a shift of 850 herts, a true bearing from Brisbane of 320 degrees, and was operating on 14090 kHz. This verifies the QTH as Ankara in Turkey, and communications are to Tehran, Iran. So you see not all Intruders are Iron Curtain based!

I have reported this to our Radio Branch, to F.C.C. via A.R.R.L., and to R.S.G.B., and hope some action can be taken.

There are many more such stations to be observed, and I would urge more Amateurs with r.t.t.y. facilities to follow Norm's initiative. Complacency, and "let's let the other fellow do it" attitude is no longer an attribute because the number of intruders are growing rapidly, and if we don't do something about it you will not be able to operate the h.f. bands soon. They'll be full of commercials.

—VK3LC, Federal Co-ordinator.

DX

Contributing Editor: DON GRANTLEY,
P.O. Box 222, Penrith, N.S.W., 2750.
Times: G.M.T.

A little care and courtesy works wonders on the bands. Every instance of rudeness or carelessness I have noted over the years has been more than offset by the activities of those who go out of their way to assist and encourage the other operator whether he be an s.w.l. or a newcomer to the Amateur ranks. Whilst speaking of assistance, can I quote here a paragraph from a letter written by a well known DX man who lives in a town quite close to me. "Can I enter a plea to VK and ZLs not to use 14 MHz. for a local natter band? There is plenty of space on 21, or why not use 160, 80 or 40 metres? One hears VKs and ZLs making skeds with one another when the band is full of DX, also if they cannot hear the DX it is possible that some other VK can, and it is most disappointing to lose a rare one when someone comes on to chat about his dahlias or fishing. Finally, the place to tune up is on the nearest commercial and not on top of the active DX QSO frequency. This means winkling out the DX, noting the frequency, and swinging the rx back on to the DX and waiting for the QSO to finish. I say waiting advisedly since some people cannot even do that and assume they have a natural right to break into a QSO." I make no comment on the foregoing, which is included at the request of the writer.

ON THE BANDS

20 metres is still producing most of the workable DX, the following stations having been worked by VK2AHK: 5U7AK, CT3AR, 5H3LV, HC2RZ, 5Z4DW, CR7IZ, ET3JH, 4X4CZ, 9P6AZ, OX3TN, JD1ABZ, 9J2LL, 4Z4HF, 5W1AE, 9U5BB (QSL to Box 14, Bujumbura, Burundi), CR7AC, 9G1BF, CR8AG, VP2MA, FL8NP, JT1KAA, ZF1GC, VP7CQ, 7Q7AD and 9Q5MF just to name a few. Geoff's list is most comprehensive, and most indicative of just what is about.

On 40 metres I have reports from Eric Trebilcock, one of the world's top S.w.l's, of HL9GK, HL7KBE, 5H2LV, VP2AAA, VP9AD and HP1IE on c.w., whilst I have logged many of the more common European stations in the early hours of the morning, most of my activity however is confined to 20 c.w.

My thanks to Mal VK2BMS for the following information on 160 mx DX. Ralph W1HGT advises that he will be on 1802 each Sunday until the end of April, 40 minutes before his sunrise and until 40 minutes after, looking for VKs. His sunrise times in GMT are April 2 1025, April 9 1013, April 16 1002, April 23 0951, and April 30 0941. Sorry I can't answer your letter Mal, as I don't have your QTH.

SCORE BUILDERS

The following stations, together with their operating times and frequencies where possible, are included to assist those who are after the new ones.

CT2BC: Mon., Tues. and Wed. 7025-7030 c.w. from 0800; Thur., Fri. and Sat. 3525-3530 c.w. (time not given). QSL to W4SYL.

FB8XX skeds manager F2MO 14120 s.s.b. at 1645, also on 7003 or 3503 c.w. at 2300. F2MO has all logs to Nov. 21, and is 100 per cent. QSL.

FH8CG 21285 s.s.b., Fri. and Sat. at 1700; QSL to Claude Labarbe, Box 135, Moroni, Comoro Is.

Andre FR7ZU/E was reported en route at about 15th Feb. for a two months' operation using FTDX500 and dipole. QSL to F9MS, but the logs won't be received until after the end of April.

JT0AE will interest the prefix hunters, 14032 on c.w. 0610, and on 21010 c.w. at 0750. QRV for three years, hopes to go s.s.b.

VP8ME now on from Sth. Orkneys, following recent operation from Halley Bay. Skeds WA5FWC 14255 s.s.b. Tues. and Sat. 0200. Also on r.t.t.y. 14003 at 0300. Manager's QTH is Gary Pannell, 2013 Melissa St., Arlington, Texas, 76010.

XU1AA is said to check into the S.E.A. net on 14320 daily at 1200, and has alternative of 0900-1500 on 14250, 1500-1600 on 40 mx, 1600-1800 on 21295, or back to 14250 if 21 is out.

ZM7AH daily 14225 s.s.b. at 1320 working to a list by W4DBT, also has been noted 14030 c.w. at around 1800.

ZS3AW daily from about 1830, 3503, 7003, 14045, 21045, 23045 c.w., also 14232 and 21327 s.s.b.; manager is DJ3KR.

NETS

Regardless of the ethics of compiling a DX score by participation in DX nets, the fact remains that they are here to stay, hence I must publicise them. The North Carolina DX-info Net, 3845 s.s.b. Tues. and Sat. at 0200 with K4CIA as net control, wouldn't be of much use here. The West African Net, 21300 s.s.b. Mon. and Wed. at 1900; the U.S.S.R. Net 3620 or 3630 s.s.b. from 2100 (also QSX around 3800), net control is UB6WJ or other UAs. The Pandoras Box DX Net, daily 14277 s.s.b. 0400 to 0430 and 0530 to 0600, with a possible QSY to 14300 at 0600 is more in our line down here. Net control is KH6HIF. When KH6HIF is net control, all QSLs for that session may be sent to him, and an award is issued for working 10 net members.

JY PREFIX ALLOCATION

The following is the list of prefixes for operation by Jordanian stations: JY1 King Hussein, JY2 the Royal Household, JY3 Advanced Class Licences (the highest), JY4 Top Class, JY5 Novices on c.w. only, JY6 Club Stations, JY7 special stations, JY8 and JY9 are set aside for reciprocal licences. One of the latter is John JY8JK who was noted working his QSL manager G3LQP in the Commonwealth Net 14170 at 1430.

QSL MANAGERS DIRECTORY

Much of the news imparted from this page, and from this QTH via tape and letter comes from the pen of Geoff Watts, whose popular DX news sheet is used by DX men far and wide. Geoff is able to distribute copies of the very comprehensive QSL managers directory, by arrangement with its compiler, W6GSV. I make no apology for giving Geoff a plug here for he has assisted us in the past, and his service is far better than that of any major business which I have been acquainted with over the years. The 76-page 1972 edition lists the QSL managers of 3,500 DX stations, the QTH of each manager, plus an up to the minute list of world QSL Bureaux. Surface mail to this country costs £1.75, which is about three VK dollars, and airmail delivery costs very little more. I suggest if anybody wants an airmail copy that they enquire the total cost from Geoff Watts, 62 Belmore Rd., Norwich, Nor 72-T.

As space is running short I will close at this stage, thanks to all who have written. 73 de Don L2022.

Despite the sunspot decline the bands appear to have been reasonably lively and interesting with good openings into "difficult" areas such as West Africa.

Darlene was on Safari again. This time to the Galapagos Islands as HC8DK from Santa Cruz. Does anybody know her next QTH? Maybe another rare spot. Hopes for an all-Australian DX-pedition (see Feb. "A.R.," page 12) to Mellish and Frederick Reefs are fading rapidly.

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PREDICTION CHARTS: READY-READER

Here are the numerical predictions for April. A word or two of explanation may be useful. As an example. The VK2 to ZS6 chart reflects a very steep rise in the M.U.F. from about 12 to 28 MHz. in the space of three hours from 1300 hrs. local. There is then a much slower decline from the peak at 1600 hrs. to a low of about 11 MHz. at 0600 hrs. The A.L.F. is shown as not extending above about 13 MHz.; the A.L.F. curve drops sharply below 7 MHz. at 0100 hrs. and rises sharply about 0800 hrs.

Now, the M.U.F. peak is at 1600 hrs. with a sharply rising face and a slower time decline. For 21 MHz. band, therefore, the "mid" time will be that of the peak—i.e. 1600 hrs. From the 1600 hrs. vertical to the sharply-rising face is two hours and to the declining curve is four hours. Hence the notation: minus 2 1600 plus 4; i.e. the theoretical opening to ZS6 is from 1400 hrs. to 2000 hrs. local time, but the possibilities of getting through to ZS6 are likely to be better after 1600 hrs. than before it. The time as given denotes a peak. If the peak is sharp only a single time notation appears. This oversimplifies the position when the A.L.F. curve intrudes.

Looking now at 7 MHz. for the same chart. The A.L.F. curve is as sharply rising as it is declining. The curve begins at 0800 hrs. and within two hours reaches 11 MHz., the decline is similar to 0100 hrs. As the M.U.F. curve at these hours is hovering around 12 MHz. there will be a theoretical opening to ZS6 on 7 MHz. from 0100 hrs. to 0800 hrs. This can be shown in this way as a numerical notation and is ordinarily so done when the curves are not too steep. When the curves are steep sided the notation reads: minus 4 0400 plus 4. This indicates a mid time as possibly least subject to disappointment, having regard to the M.U.F. However, there is a slight lowering of the M.U.F. in the period 0400 to 0700 hrs. from 12 MHz. to a little over 10 MHz. Because of this factor, the numerical notation will merely read 0000-0800 since, if the M.U.F. drops further than predicted the mid-period of the A.L.F. "opening" may produce no opening at all because of the M.U.F. It does show, however, that an opening on 3.5 MHz. could be a possibility.

The object of any prediction chart or numerical notation is to indicate the approximate times when openings might ordinarily be expected to occur during the period in question. Hence, the indication of a sharp peak in the M.U.F. as seen on the 21 MHz. band would indicate that this band could open to the area concerned on "good" days, but in any event a 14 MHz. opening would be possible subject to the antics of the A.L.F. curve. Two notations indicates two peaks.

Here are the predictions for April, courtesy of the I.P.S. Predictions, Series P:—

Times—Local for first-named area.
VK4(T) is Townsville.

28 MHz. Band:

VK2—8P (S.P.)		0900
W6	minus 2	0900 plus 4
VK9 (1F)		0800-1700
ZS6		1600
5Z4	minus 1	1500 plus 3
9G (S.P.)		1700
VK3—KH6		1000-1700
VK4(T)—KH6	minus 6	1300 plus 4
VK5—KH6	minus 5	1300 plus 3

21 MHz. Band:

VK2—8P (S.P.)	minus 3	0900 plus 8
VE1 (S.P.)		0600-1100
VE1 (L.P.)		0900
W6	minus 3	0900 plus 6
PY1	minus 1	0900 plus 2
VK0 (MIs)	minus 5	1300 plus 5
ZS6	minus 2	1600 plus 4
5Z4	minus 2	1500 plus 5
9G (S.P.)	minus 1	1000 plus 3
	minus 1	1700 plus 3
9G (L.P.)	minus 1	0600 plus 4
	minus 1	1700 plus 2
VK6 (2F)		1300-1700
(1F)	minus 6	1400 plus 6
G (S.P.)		1900
(L.P.)		0700
VK3—VK8 (2F)		1000-1700
(1F)		0800-2000
VK5—KH6	minus 7	1300 plus 6
VK4(T)—KH6		1400-0300
		0500-0700
VK6—VK9		0700-1700
G (S.P.)	minus 5	2100 plus 1

14 MHz. Band:

VK2—8P (S.P.)		0600-0000
VE1 (S.P.)		2200-0200
VE1 (L.P.)	minus 1	0900 plus 4
W6		0600-2000
		0100-0300
PY1	minus 3	0900 plus 9
	minus 1	2000 plus 2
VK0 (MIs)	minus 6	1300 plus 8
VK6 (2F)		0900-2000
ZS6		1400-2300
5Z4		1300-1500
		2100-0400
		0800-1000
9G (S.P.)		0700-1800
9G (L.P.)		1300-1400
		1600-2000
G (S.P.)		2000-0700
G (L.P.)	minus 1	0700 plus 5
	minus 2	1800 plus 3
VK3—VK8		0800-2000
VK5—KH6		1200-0600
VK6—VK9	minus 6	1200 plus 8
G (S.P.)		2000-0500
		0700-1000
G (L.P.)	minus 3	1800 plus 2
	minus 1	0700 plus 2

7 MHz. Band:

VK2—8P (S.P.)	minus 2	1800 plus 3
W6		1700-0100
VE1 (S.P.)		1700-2200
VE1 (L.P.)		0800
PY		1700-2000
ZS6		0000-0800
5Z4		0100-0800
9G (S.P.)		0300-0800
G (S.P.)	minus 2	0500 plus 2
G (L.P.)		0500-0600
VK3—VK8		1900-0600
VK5—KH6		1600-0200
VK6—VK9		1800-0500
G (S.P.)		0100-0700

3.5 MHz. Band:
Reduce the 7 MHz. by one hour.

VHF

Contributing Editor: ERIC JAMIESON, VK5LP,
Forreston, South Australia, 5233.

Closing date for copy 30th of month.
Times: E.A.S.T.

AMATEUR BAND BEACONS

VK0	53.100	VK0MA, Mawson.
	53.200	VK0GR, Casey.
VK3	144.700	VK3VE, Vermont.
	144.925	VK3ZQC, Moe South.
VK4	52.400	VK4WI/2, Townsville.
	144.390	VK4VV, near Toowoomba.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Bickley.
	52.950	VK6VE, Mt. Barker.
	144.500	VK6VE, Mt. Barker.
	145.010	VK6VE, Bickley.
VK7	144.900	VK7VF, Devonport.
VK9	144.600	VK9XI, Christmas Island.
ZL1	145.100	ZL1VHF, Auckland.
ZL2	145.200	ZL2VHF, Wellington.
ZL3	145.300	ZL3VHF, Christchurch.
ZL4	145.400	ZL4VHF, Dunedin.
JA	52.500	JA1IGY, Japan.
HL	50.100	HL9WI, South Korea.

There has been some pruning of the beacon list this month. In the absence of any information indicating whether in operation or not, the previous VK0 beacons have been removed and the new listings above substituted. I am indebted to Roger Harrison, VK2ZTB, Senior Technical Officer, Low Latitude Division of the Ionospheric Prediction Service for the following: (letter dated 7/2/72): "Firstly for your beacon list, it is hoped that, by the time this reaches you the VK0GR beacon, built by the I.P.S.D. workshop, will be operational from Casey (110° 32′ East Long. by 66° 15′ South Lat.). The beacon for Mawson VK0MA (also built by I.P.S.D. workshop) should be operational shortly after. Both beacons run somewhat more than 120 watts output with A2 (keyed tone, 1 kHz.) modulation. The sequence is 7 seconds of call sign followed by 3 seconds of carrier and then repeated. The antenna will be 3 element, wide-spaced yagis beaming across the Australian mainland. The frequency for VK0GR is 53.200 MHz. and VK0MA is 53.100 MHz. The modulation depth is approximately 30 per cent. Reception reports would be appreciated and should be sent to the High Latitude Section, I.P.S.D., 162-166 Goulburn St., Darlinghurst, N.S.W., 2010."

It appears from an h.f. contact with the Carnarvon area that VK6TS is not now operational, that has been deleted until further notice. All other overseas beacons have been removed except JA and HL. Overseas beacons will be published for the time being as a separate listing in the September issue.

Of noteworthy interest seems to be the lack of reports concerning any reception (to me anyway, VK5LP) of the four ZL 144 MHz. band beacons. I would be interested to hear from anyone having heard any of these during the last DX season.

144 MHz. DX

Further to my notes regarding Garry VK5ZK last month, tending pot plants has now been forsaken for really serious 144 MHz. DX across the waters to Albany, W.A. The following should be of considerable interest to all Australian v.h.f. operators, and our prize for this month goes to Garry for his tenacity. Here is a resume of 2 metre openings across southern Australia for the past two months:

3/1—5ZK worked 6XY, 5 x 4 sigs.
16/1—5ZK worked 6XY, 5 x 4.
17/1—5ZK worked 6BE, 5 x 3. 6XY worked 5ZTN, 5MC. 6BE worked 5ZTN, 5DK, 5MC.
23/1—5VF beacon copied in Albany S5. 6WA and 6SS heard in Mt. Gambier, on c.w., no QSOs.
27/1—6BE copied 5ZK on c.w. No QSO.
6/2—6BE copied 5ZK on c.w. No QSO.
7/2—6BE worked 5KA, 5ZTN, 5ZK, 5ZDX, 5GG, 5RO, 5ZDR, 5QZ. 6BE heard 5ZK on 432 MHz. at S1 at 2230 ESST.
22/2—6XY, 6BE and 6WG heard several Adelaide stations; no QSO. 6VE beacon not audible in Adelaide. 5VF beacons peaking S7. 10 kw. tropospheric beacon on 135 MHz. very strong (transmits from Albany using beam pointing east).
23/2—10 kw. beacon S6. 6VE at S5 at 2115. No QSO.
24/2—6VE to S6 during morning, 10 kw. beacon up to S7.
26/2—6VE heard weakly by 5ZK and 5ZDY. 10 kw. beacon S7 on peaks, for hour, then disappeared.

Garry reports nothing has been heard between 26/2 and time of these notes (28/2). He believes it logical the 135 MHz. beacon should be heard well, as it runs high power and has a directional antenna. It is also better situated than 6VE, being on the coastline. 6VE is about 20 miles inland, and signals need to travel for about 100 miles over land before striking the ocean. Bernie VK6KJ, with more time to spare these days, is planning to get back on 144 MHz. from Albany, so with four stations available from there and gradually improving equipment, some interesting contacts may be forthcoming, including 432 MHz. Garry maintains a daily sked with Albany on 14.130 MHz. at 2000 EST.

It is noted a short paragraph in the Feb. Newsletter of the VK2 V.h.f. and T.v. Group, regarding interest currently being shown in Wagga, N.S.W., for operation on 144 MHz. tuneable. Several Amateurs there are constructing 2 mx gear and Phil VK2YS proposes transverting from his FT101. This is good news for VK3 and VK5. Distance to Melbourne about 240 miles and Adelaide 500 miles. Melbourne should not be too much trouble, good conditions could see signals reaching Adelaide; after all, the VK5ZDX Field Day station worked nearly that far last December with good signals!

SIX METRES TO JA

Wally VK5ZWW advises hearing JA signals in Adelaide on 26th Feb. around 1800. JA2WVO on a.m. on 52.07, JA1 on 52.010 weak, JA7 on 50.1. Beacon station JA1IGY on 52.5 not audible. Wally suggests any stations from that area heard below 52 MHz. are not likely to be interested in working VK, and suggests not getting too worked up about them if you cannot attract their interest. Wally will be returning to New Zealand for a month from the middle of March to renew old acquaintances, so there will be no M/S experiments during that time.

Andrew VK1DA sends a letter with an outline of VK1 v.h.f. activity. He advises slow progress with the 144 MHz. beacon. Latest thoughts are to place it on a rooftop 10 storeys high in the centre of the city, and possibly using FSK at 850 Hz. shift. On 20/2 Andrew and Eddie VK1VP both worked VK2NN in Sydney on 52 MHz. on a direct path. This is considered a difficult thing to do due to the mountainous terrain in between. Usual method to work Sydney is via backscatter. Andrew also remarks on a point I have often raised: The virtual futility of setting up a National Field Day station to operate on v.h.f. only, pointing out that Eddie VK1VP scored 437 points only after much effort, while he (Andrew) ran up 1600 points with one h.f. rig. 52 MHz. close to dead with only 91 points!

A similar situation existed in VK5 with the N.F.D. VK5AWI went out in force covering the h.f. and v.h.f. bands, scored some 3,000 points, but again the v.h.f. participation by other stations was most disappointing, bringing Bob VK5ZDX, who manned the v.h.f. station, to say v.h.f. on such an occasion on the present points system was not worth the effort in setting up a substantial v.h.f. station—and I am forced to admit he is quite right. Unless something is done soon to bolster scoring for v.h.f. operators in the Field Day it will very soon be like the Remembrance Day Contest—purely an h.f. contest!

VK7 appears to figure quite actively during February and thanks to the operation of their beacon VK7VE, many contacts were made to VK3 and into Mt. Gambier area of VK5, on 144 MHz. During the last week of Feb. 432 MHz. was of particular interest. Winston VK7EM worked VKs 3BDL, 3ZBB, 3ZYO, 3ZUT, 3AKC, 3ZBZ, 3ZUR, 3ZPA and 3AOT. VK7ZAH was worked by Ron VK3AKC. On Thursday, 24/2, Amateur Television was received across Bass Strait for what is believed to be the first time ever. Bill VK3ZBZ received snowy pictures from Winston VK7EM. On Saturday 26/2 Peter VK3ZPA at Sunbury received completely noise-free pictures from Winston and was able to read valve markings only a quarter of an inch high when VK7EM pointed the camera at his 432 MHz. transmitter. Greg VK3YGB in Essendon also copied the pictures from VK7EM. Congratulations chaps, your efforts have finally been rewarded. On the same Saturday morning on 1296 MHz., Ron VK3AKC in Geelong worked VK7ZAH in Launceston, and again on Saturday night, this distance of 274 miles equalling Ron's present Australian record.

Interesting to note that the ZL Propagation Project Group in VK3 are going ahead with equipment design, after meeting at the QTH of Dave VK3ZDH. To lend support to their activities and beliefs for something more consistent in trans-Tasman contacts, it is noted that ZL1GM was recently believed copied on 2 metres Channel B in Melbourne, on the same night that New Zealand Channel 3 TV on 70 MHz. was copied on TV receivers in Melbourne. Thanks to Bob VK3AOT for the last two paragraphs.

Mike VK2II passes on further information regarding the Ionospheric Prediction Service warning system for the coming equinoxial period. Although the operation of this warning system will be more than half completed before you read this, I feel it is essential for you to be advised even if only a week of the period is left. The warning system starts on 14th March and concludes on 9th April. 11440 kHz. will be used from 1600 to 2000 hrs. and 6815 kHz. from 2000 to 2100, and possibly to 2200 depending on conditions at the time. This will continue each day of the week except Monday. Both frequencies use upper sideband operation.

Information will be broadcast every quarter hour on the following basis: 2 minutes past the ¼ hour: Sydney will give a summary of previous reports. 4 minutes past the ¼ hour: Canberra observations. 7 minutes past: Brisbane observations. 10 minutes past: Townsville reports, including M.O.F., and advice on reception or otherwise of Korean f.m. station on 45.9 MHz. or JA1IGY on 52.5 MHz. After 1915 hours reports may be transmitted from the New Guinea station at any time.

As pointed out last month, this warning system is to provide advance information of the possibility of trans-equatorial propagation (T.E.P.) due to increasing maximum observable frequencies on the various Australia-Japan circuits, relating particularly in the case of the Amateurs to 52 MHz., but keeping an eye on 144 MHz. Afternoon type T.E.P. may be observed betwen 1200 and 1900 hours and evening type between 2000 and 2300 hours. Afternoon type T.E.P. signals tend to have very little or no fading, while evening-type signals are accompanied by a very deep, rapid flutter. Both types may exhibit very strong signals. Afternoon signals are usually found between 28 and 65 MHz., while evening type signals may go higher.

The "Victorian VHF-er" lists 40 stations having obtained the Cook Bi-Centenary Award V.h.f./U.h.f. Section. 9 from VK2, 12 from VK3, 10 from VK4, 7 from VK5, 2 from VK7. Of this total 7 only were Amateurs with full licensee participation. Greater overall interest may have been shown had the award been available for an earlier start.

That will have to do for this month. Guess I have missed something interesting—someone will tell me later! Closing with the thought for the month: "Perhaps host and guest is really the happiest relation for father and son." 73, Eric VK5LP, The Voice in the Hills.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

INTRUDERS

Editor "A.R.," Dear Sir,

With reference to my recent letter regarding the "QRM Brigade" it is gratifying to know that amongst the apathetic Amateur fraternity at least I have one supporter (although the VK7 boys have been heard carrying out the idea).

I heard on the air the other day two VK3s complaining, and I quote: "20 metres was full of commercials the other evening, both on the c.w. and the sideband ends, and there were very few Amateurs indeed".

What a state of affairs? Why don't we all get on the bands and QRM them off?

It is my considered opinion, for what it is worth, that the Intruder position is so hopeless because of the difficulty of getting positive identifications (and without such diplomatic representation is impossible) that the Amateur has only one recourse, and that is to take the matter into his own hands, crowd the bands, and make it so hard for the commercials to get their traffic through that they will shift to another sector of the frequency spectrum.

Intruders, you may be well assured, do not only operate the Amateur bands, they're on other frequencies too, but they find the Amateur frequencies easy prey, and open spaces to operate without QRM. Those that I advocate QRMing only use as much or less power than we, and they'll soon move if QRMed enough, and out of the band too, so go to it! You will not be sanctioned for it.

—Alf Chandler, VK3LC.
Intruder Watch Co-ordinator, W.I.A.

— . . . —

SUNSPOT PREDICTIONS

April 49, May 47, June 45, July 44. Provisional sunspot numbers for January 1972 varied from 135 on 24th to a low 22 on 11th. Smoothed mean for July 1971: 63.6. From Swiss Federal Obs., Zurich.

SILENT KEYS

It is with deep regret that we record the passing of:—

VK2AT/T—L. Altman.
VK4KB—P. J. Kelly
VK6PL—P. L. Mahan

W.I.A. AWARDS

52 MHz. W.A.S. AWARD

New Members:

Cert. No.	Call	Additional Countries
99	VK7ZRO	–
100	VK3AMK	2
101	VK4ZFB	3
102	VK4ZIM	3

V.H.F.C.C.

New Member:

Cert. No.	Call	Confirmations 52 MHz.	144 MHz.
81	VK4ZFB	375	—

Amendments:

Cert. No.	Call	Confirmations 52 MHz.	144 MHz.
44	VK3AMK	197	—
73	VK3AMK	—	127
80	VK4ZIM	749	—

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	320/344	VK4VX	296/296
VK6RU	318/344	VK5AB	296/314
VK3AHO	310/326	VK2APK	293/300
VK4KS	307/322	VK4FJ	286/307
VK4UC	303/303	VK4TY	284/288
VK6MK	303/324	VK3ZE	279/282

New Members

Cert. No.	Call	Total
126	VK5QB	103/103
127	VK2ZA	112/112
128	VK4VX	296/296
129	VK8CW	142/142

Amendments:

VK3AMK	240/240	VK4RF	224/224

C.W.

VK3AHQ	310/325	VK3XB	270/284
VK2QL	305/328	VK6RU	265/288
VK2APK	289/297	VK3YD	263/282
VK4FJ	289/315	VK4TY	259/272
VK3YL	287/304	VK3TL	254/260
VK3NC	273/300	VK3RJ	249/263

New Member:

Cert. No.	Call	Total
99	VK4VX	235/235

Amendments:

VK4RF	196/208	VK3LV	118/118

OPEN

VK6RU	318/344	VK4VX	304/304
VK4SD	315/330	VK4UC	303/303
VK2VN	311/330	VK6MK	303/324
VK4KS	308/327	VK2EO	301/325
VK2APK	307/319	VK2SG	298/304
VK4TY	306/321	VK4FJ	297/323

New Member:

Cert. No.	Call	Total
138	VK4VX	304/304

Amendments:

VK4RF	260/272	VK3LV	123/123

BOOK REVIEW

BEAM ANTENNA HANDBOOK

A book which should be in the bookshelves of every Amateur. In clear language amply supported by explicit diagrams and photographs, this book explains the theory of parasitic beam antennas so that it can clearly be understood by everybody.

The two hundred pages not only cover the theory and design of parasitic beams, but also complete construction details of all-metal arrays, composite structures, multiband beams, stacking of beams, wire-beam antennas, 40 metre compact beams, antenna installation, how to evaluate your beam, some useful test instruments, and the extremely successful and popular W6SAI compact 20 metre beam.

Author: William I. Orr, W6SAI; publisher: Radio Publications Inc.; availability: Divisional Secretaries or Federal Publications.

HAMADS

Four lines FREE for members only.

See Jan. 1972 "A.R." page 23 for complete details.

FOR SALE

McKinnon, Vic.: 1 A.W.A. 50w. FM Base, BS-50-B, mod. to 52.5 MHz., 2 ch., tx-rx xtals and wall mount. 1 A.W.A. Rem. Control RC-1A, AC/DC PS-Skpr. and A.W.A. Deck VR Mic. set. VG cond. $100. VK3EM QTHR. Ph. (03) 58-7745.

Hazelwood Park, S.A.: "QST," solid 1944 to date in A.R.R.L. Binders; Heathkit SB102 Transceiver; Cush Craft 6 and 2 mx antenna; VK5QO, 25 Russell Ave., 5066. Ph. 79-5103.

Ararat, Vic.: Hallicrafters HT32 Tx, $200; Lafayette HA350 Rx, $175. Both in good order. Freq. Meter Class "C", $10. Any offer considered, changing QTH. VK3AQD, Box 25. Ph. 21821.

Maldon, Vic.: Numerous bits and pieces, 108T/SCR, 122 set, Q5er, and many other items. Must clear, no reasonable offer refused. Write, phone or call. VK3FO QTHR. Ph. (054) 75-2245.

Sydney, N.S.W.: Swan 350 complete with all manuals and matching power supply. Condition as new; had little use, owner having been overseas. Cash price $400. Ph. (02) 90-1766. Al Davis-Rice.

Sydney, N.S.W.: Galaxy V. Mk. 2 PS, 2 el. 2 bd. Quad, SX100 Rx, LSG11, BC221, VTVM, two MR10Bs, TCA1674, Pye Reptr., 450 MHz. PA 2X4CX150A, Valve Tester Paton VCT-V, 522, GDO, Xtal Filt., Ant. 2 mx 4 el. 6 mx 5 el., shack sell out. Inquiries Ph. (02) 519-1504 A.H.

Kyabram, Vic.: Swan 350, good condition, inspection invited, or can be heard on air, $285.00. Power supply and speaker for same, $15. VK3TG, QTHR. Ph. 058-5/21636.

Frankston, Vic.: Mosley V-4-6 Trap Vertical Antenna, 40-20-15-10 mx, $28. VK3CDR QTHR. Ph. 698-6058 or 787-2318 (A.H.).

Mt. Waverley, Vic.: Yaesu FL-DX-400 Transmitter, 12 months old, as new, $275. VK3ARY QTHR. Ph. (03) 277-4798.

Ceduna, S.A.: FL-200B Transmitter, $220 o.n.o. FL-DX-2000 Linear Amp., $180 o.n.o. Trio JR300S Receiver, 80-10 mx with mechanical filter, $120 o.n.o. VK5IG, Box 244, Ceduna. Ph. 295 or 325 AH.

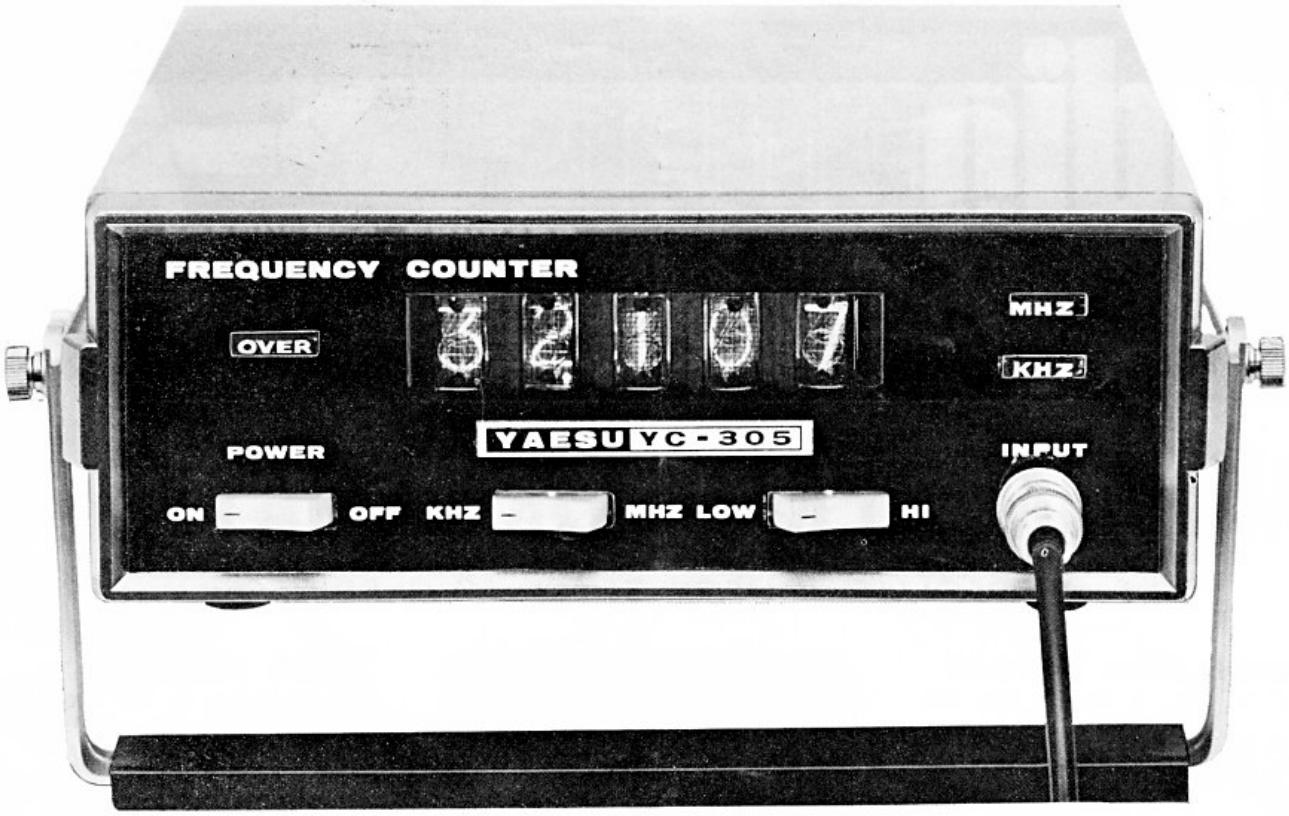
WANTED

Melbourne, Vic.: Does anyone have old copies of "Radio Constructor" or "Practical Wireless" for sale? VK3AQ QTHR. Ph. (03) 288-2326.

Reservoir, Vic.: DX-20 or equivalent crystal-locked low power c.w. Transmitter. Write C. Nichols, VK3BGF, 162 Spring Street.

Melbourne, Vic.: Case and Coils suit BC312 or BC342 HF Rx; both genemotors suit ARC3 or ARC49 PSU; Control Unit type MN28E suit Bendix Radio Compass MN26H, tuning range 200-400 kHz., 550-1200 kHz., 2900-6000 kHz.; unmod. tuning units RF24, 25, 26, 27. VK3AOB, 76 David Ave., East Keilor. Ph. (03) 337-4902.

Goulburn, N.S.W.: 2 mx Transceiver, hybrid, similar to TCA1675-77. Good price for good unit. Contact Robert Girdo, VK2ASD, C/o. Radio 2GN, Goulburn, 2580. Pho. (064) 21-3377, AH 29-7137.



NEW DIGITAL FREQUENCY COUNTER

Model YC-305, 30 MHz., 5 digits *from YAESU*

FEATURES

★ Compact design by advanced IC technique to count over wide frequency range, 5 Hz. to 30 MHz.

★ Dual range system provides eight-digit measurement with selectable MHz. and kHz. ranges.

★ Double sided epoxy circuit board for stable and accurate service for many years. Dual power pack built in for operation from either 12v. DC or AC mains.

★ PRICE: **$360**, includ. S.T. (freight extra)

SPECIFICATIONS

Frequency Range: 5 Hz. to 30 MHz.
Accuracy: ± time base stability + 1 count.
Gate Times: 1 milli-second or 1 second.
Frequency Unit: MHz. and kHz.
Input Impedance: High, 1M ohms; low, 56 ohms.
Input Capacity: Less than 20 pF.
Maximum Input: 60V. p-p less than 10 sec.; 20V. p-p continuous.
Time Base Frequency: 1,000 kHz. crystal controlled.
Stability: 0.0005% at 25°C.; 0.0025% at 0-40°C.
Power Requirement: 100-110-117-200-220-234V. AC, 18VA.; or 12-14.5V. DC 1A.
Dimensions: 220 mm. wide x 80 mm. high x 270 mm. deep. 8¾" wide x 3¼" high x 10½" deep.
Weight: Approx. 3.5 kg. (8 lbs.).
Tubes and Semiconductors: 25 integrated circuits, 8 silicon transistors, 1 FET, 11 silicon diodes, 5 display tubes.

Price and Specifications subject to change.

Australian Agents:

BAIL ELECTRONIC SERVICES

60 SHANNON STREET, BOX HILL NORTH, VIC., 3129 Telephone 89-2213

N.S.W. Rep.: **STEPHEN KUHL, P.O. Box 56, Mascot, N.S.W., 2020.** Telephone: Day 67-1650 (AH 371-5445)
South Aust. Rep.: **FARMERS RADIO PTY. LTD., 257 Angas St., Adelaide, S.A., 5000.** Telephone 23-1268
Western Aust. Rep.: **H. R. PRIDE, 26 Lockhart Street, Como, W.A., 6152.** Telephone 60-4379

MULTIMETERS FOR AMATEURS

SPECIALS—CHECK THESE LOW PRICES

MODEL SK100: 100K O.P.V.

D.C. V.: 0.6, 3, 12, 60, 300, 600, 1200.
A.C. V.: 6, 30, 120, 300, 1,200.
D.C. mA.: 0.012, 0.3, 6, 60, 600, 12A.
OHMS: 1 Ω to 20 MΩ in 4 ranges.
SIZE: 7" x 5¼" x 2½".
PRICE: **$30.40** + 15% sales tax.

MODEL SK7: 4K O.P.V.

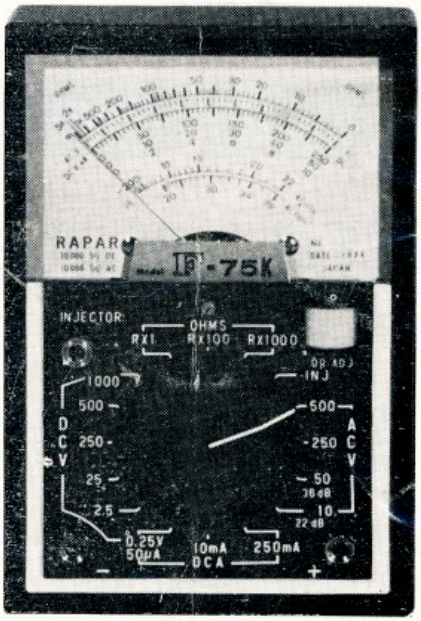
D.C. V.: 10, 50, 250, 1,000.
A.C. V.: 10, 50, 250, 500, 1,000.
D.C. mA.: 0.25, 10, 250.
OHMS: 10 Ω to 2 MΩ in 2 ranges.
SIZE: 4⅞" x 3½" x 1½".
PRICE: **$8.80** + 15% sales tax.

MODEL M303: 30K O.P.V.

D.C. V.: 0.6, 3, 12, 60, 300, 1,200.
A.C. V.: 6, 30, 120, 300, 1,200.
D.C. mA.: 0.06, 6, 60, 600.
OHMS: 2 Ω to 8 MΩ in 4 ranges.
SIZE: 5¾" x 3¾" x 2".
PRICE: **$17.50** + 15% sales tax.

MODEL SK120: 20K O.P.V.

D.C. V.: 0.6, 3, 12, 60, 300, 1,200.
A.C. V.: 6, 30, 120, 300, 1,200.
D.C. mA.: 0.06, 6, 60, 600.
OHMS: 2 Ω to 8 MΩ in 4 ranges.
SIZE: 5¾" x 3¾" x 1¾".
PRICE: **$14.50** + 15% sales tax.



MODEL F75K: 30K O.P.V.

D.C. V.: 0.25, 2.5, 25, 250, 500, 1,000.
A.C. V.: 10, 50, 250, 500.
D.C. mA.: 0.05, 10, 250.
OHMS: 1 to 8 megohms in 3 ranges. Inbuilt Signal Injector.
PRICE: **$18.50** + 15% sales tax.

MODEL TP5SN: 20K O.P.V.

D.C. V.: 0.5, 5, 50, 250, 500, 1,000.
A.C. V.: 10, 50, 250, 500, 1,000.
D.C. mA.: 5, 50, 500.
OHMS: 0.5 MΩ in 4 ranges.
PRICE: **$15.00** + 15% sales tax.

MODEL 500B: 30K O.P.V.

D.C. V.: 0.25, 1, 2.5, 10, 25, 100, 250, 500, 1,000.
A.C. V.: 2.5, 10, 25, 100, 250, 500, 1,000.
D.C. mA.: 0.05, 5, 50, 500; 12A.
OHMS: 1 Ω to 8 MΩ in 3 ranges.
PRICE: **$25.00** + 15% sales tax.

MODEL MVA5: 20K O.P.V.

D.C. V.: 5, 25, 50, 250, 500, 2,500.
A.C. V.: 10, 50, 100, 500, 1,000.
D.C. mA.: 2.5, 250.
OHMS: 1-6 MΩ in 2 ranges.
SIZE: 4½" x 3¼" x 1⅛".
PRICE: **$12.00** + 15% sales tax.

MODEL TS-60R: 1K O.P.V.

D.C. V.: 15, 150, 1,000.
A.C. V.: 15, 150, 1,000.
D.C. mA.: 1, 150.
OHMS: 1K to 100K.
SIZE: 2¼" x 1¼" x 3½".
PRICE: **$6.75** + 15% sales tax.

SPECIAL CLEARANCE of "MASTER" and "PATON" High Quality PANEL METERS at SPECIAL PRICES.
Write for details to the Instrument Department.